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CSM/LM SPACECRAFT OPERATIONAL DATA BOOK

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VOLUME III
MASS PROPERTIES

(NASA-TM-X-69016) CSM/LM SPACECRAFT OPERATIONAL DATA BOOK. VOLUME 3: MASS PROPERTIES DATA BOOK (NASA) 1 Apr. 1971 266 p
X73-70102
Unclas
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CSM/LM SPACECRAFT OPERATIONAL DATA BOOK

VOLUME III
MASS PROPERTIES DATA BOOK

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REVISIONS

REV LTR	AMEND NO.	DESCRIPTION	DATE	APPROVED

PREFACE

This document is the third revision issue of the Mass Properties Data Book. In this revision Missions "C", "C-Prime", "D", "F", "G", "H1", "H2", and "H3" have been deleted. The third revision incorporates Amendments 1 through 101, except those amendments associated with Missions "C", "C-Prime", "D", "F", "G", "H1", "H2", and "H3". Amendments released subsequent to publication of this Mass Properties Data Book, Revision 3, will be numbered sequentially with the next revision number (i.e., 102 and on).

In addition, Section 3.1, Mission J1 has been updated in this revision to include the latest sequential mass properties, propellant loads, transferable equipment mass properties, and trapped propellants. The LM-10 trapped propellants contained in Section 5.6 have also been updated.

VOLUME III

MASS PROPERTIES DATA BOOK

1.0 Introduction

2.0 Configuration and Reference Station Locations

3.0 Mass Properties and Loading Data by Mission

  3.1 Mission J1

  3.2 Mission J2

  3.3 Mission J3

4.0 CSM Reference Consumables Mass Properties Data

  4.1 SPS Tank Consumables Mass Properties, Trapped Propellants, SPS Density Equations and Graphs, and SPS Loading Windows

  4.2 RCS/ECS/EPS Consumables Mass Properties

  4.3 CSM RCS Load Calculation Tables and Loading Windows

  4.4 CM Ablator Data

5.0 LM Reference Consumables Mass Properties Data

  5.1 LM Descent Tank Mass Properties

  5.2 LM Ascent Tank Mass Properties

  5.3 LM RCS Tank Mass Properties

  5.4 LM Descent Water Tank Mass Properties

  5.5 LM Ascent Water Tank Mass Properties

  5.6 LM Trapped Consumables

1.0 INTRODUCTION

1.1 SCOPE

The complete Spacecraft Operational Data Book for the manned missions will consist of six separate volumes. These are defined as follows:

Volume I - CSM Data Book

Part I - Constraints and Performance
Part II - Launch Mission Rule Redlines

Volume II - LM Data Book

Part I - Constraints and Performance
Part II - Launch Mission Rule Redlines

Volume III - Mass Properties Data Book

Volume IV - EMU Data Book

Volume V - ALSEP Data Book

Volume VI - CSM EXPERIMENT Data Book for J-Missions

Volume VII - LCRU/GCTA Data Book

Volumes I and II present operational information on the capabilities and limitations of the spacecraft. A brief discussion of the purpose and scope of Volume III follows:

1.2 PURPOSE

The purpose of this document is to provide spacecraft mass properties data per mission for use in the mission planning activities, trajectory documentation, mission simulations, and to provide all necessary information and documentation for consumable loading. The data contained herein represent the latest predictions for the launch configuration mass properties and consumable loadings. Updates to these data will be provided based on the actual weight and balance data for each spacecraft. Mass properties data will be maintained and updated through the actual consumables loading.

Section 2.0 presents relevant spacecraft configuration drawings and station locations which may be useful in describing the location of various spacecraft components and the relationship of coordinate systems in the launch and docked configuration.

Section 3.0 presents mass properties and consumable loading data for each mission. Included in this section are the predicted mass properties for the launch configuration, the docked configuration, the normal entry, and for launch aborts.

Sections 4.0 and 5.0 contain consumables mass properties data and mission independent consumable loading information for the CSM and LM, respectively. In addition, CM ablator material data are provided in Section 4.0 to aid the user in determining CM mass properties during reentry.

Amendments to this document will be made by page additions or replacements. Data changed by an amendment will be denoted by an amendment date in the upper right hand corner and a vertical bar in the page margin to locate the change.

TABLE 1-1

SELECTED ABBREVIATIONS AND ACRONYMS

ACT	Activation
ACQ	Acquisition
ALIGN	Alignment
ANG	Angle
ASCT	Ascent
APS	Ascent Propulsion Subsystem
A/S	Ascent Stage
ASSY	Assembly
BIOINST	Bioinstrumentation
CANN	Cannister
CAM	Camera
CK	Check
CIRC	Circularization
CSC	Close-Up Stereo Camera
COMPT	Compartment
CDR	Commander
CM	Command Module
CMP	Command Module Pilot
CSM	Command Service Module
COMM	Communication
CSI	Concentric Sequence Initiation
CWG	Constant Wear Garment
CONT	Container
CLSRC	Contingency Lunar Sample Return Container
DSEA	Data Storage Electronic Assembly
DECONTAM	Decontamination
DEPL	Depletion
DSCT	Descent
DOI	Descent Orbit Insertion
DPS	Descent Propulsion Subsystem
D/S	Descent Stage
DOCK	Docking
EOI	Earth Orbit Insertion
ELECT	Electrical
ECU	Environmental Control Unit
EQUIP	Equipment
EXCL	Exclude
EXC	Excursion
EXP	Experiment
EV	Extravehicular
FWD	Forward
HASS	Hasselblad
INDIC	Indicator
INFLT	In-Flight

TABLE 1-1 (CONTINUED)

ICG	In-FLight Coverall Garment
IV	Intravehicular
JETT	Jettison
LES	Launch Escape System
LEV	Launch Escape Vehicle
LV	Launch Vehicle
LH	Left Hand
LEB	Left Hand Equipment Bay
LIQ	Liquid
LEC	Lunar Equipment Conveyor
LM	Lunar Module
LOI	Lunar Orbit Insertion
LS	Lunar Surface
LMP	LM Pilot
LUN	Lunar
MC	Main Chute
MECH	Mechanism
MCC	Midcourse Correction
N/A	Not Available
OPS	Oxygen Purge System
PR	Pair
PGA	Pressure Garment Assembly
PROC	Procedure
RAD	Radiation
RCS	Reaction Control System
RELOC	Relocation
RESTR	Restraint
RT	Right
RH	Right Hand
RHEB	Right Hand Equipment Bay
SRC	Sample Return Container
SCRS	Scissors
SEP	Separation
SM	Service Module
SLA	Service Module LM Adapter
SPS	Service Propulsion System
S/C	Spacecraft
STG	Stage
STORE	Storage Tank
STOW	Stowage

TABLE 1-1 (CONCLUDED)

SUBSYS	Subsystem
SUMP	Sump Tank
SURF	Surface
SYS	System
RSS	Root Sum Square
TEMP	Temporary
TBD	To Be Determined
TEI	Transearth Insertion
XFR	Tranfer
TLI	Translunar Insertion
TRANS	Transposition
TRANS/DOCK	Transposition and Docking
UMB	Umbilical
UPR	Upper
UEB	Upper Equipment Bay
UCTA	Urine Collection Transfer Assembly
WT	Waist Tether
W/	With
W/O	Without

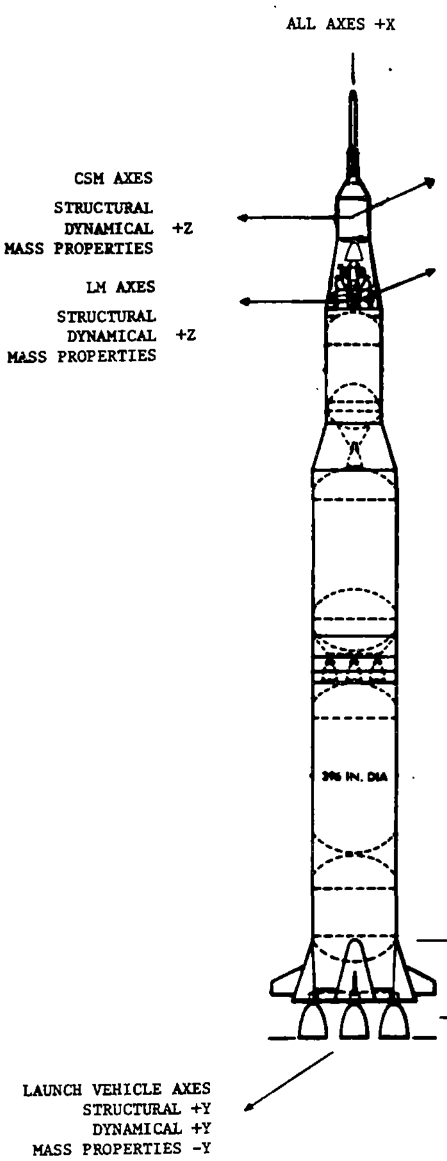
2.0 CONFIGURATION

This section provides relevant spacecraft configuration drawings and station locations which may be useful in describing the location of various spacecraft components and the relationship of coordinate systems in the launch and docked configuration for Block II CSM spacecraft and Lunar Modules.

Configuration data are presented in the following categories and order:

1. Apollo Vehicle Coordinate System.
2. Saturn V Vehicle Outboard Profiles and Reference Dimensions.
3. Apollo Spacecraft Reference Stations, Thrust Chamber Locations, and CSM Consumables Tank Locations.
4. Lunar Module Reference Stations, Thrust Chamber Locations and LM Consumables Tank Locations.

Consumables mass properties data for the CSM and LM may be found in Sections 4.0 and 5.0, respectively, of this volume. These consumables mass property data must be compared to the onboard consumable loading data for each mission in Section 3.0 to determine the actual mission tanked consumables mass properties.



NOTES:

1. DYNAMICAL AXES ORIGIN. THE DYNAMICAL AXES ORIGINS ARE LOCATED AT THE CENTER OF MASS FOR EACH CONFIGURATION.
2. STRUCTURAL AXES ORIGIN.
   a. THE LAUNCH VEHICLE STRUCTURAL AXIS ORIGIN IS 100 INCHES BELOW THE S-IC GIMBAL REFERENCE PLANE.
   b. THE CSM STRUCTURAL AXIS ORIGIN IS 1000 INCHES BELOW THE MOLD LINE OF THE HEAT SHIELD MAIN STRUCTURE ABLATION INTERFACE.
   c. THE LM STRUCTURAL AXIS ORIGIN IS 200 INCHES BELOW LM ASCENT STAGE BASE.
3. MASS PROPERTIES AXES ORIGIN.
   a. THE SPACECRAFT MASS PROPERTIES AXIS ORIGIN IS COINCIDENT WITH THE CSM STRUCTURAL AXIS ORIGIN.
   b. THE LAUNCH VEHICLE MASS PROPERTIES AXIS ORIGIN IS COINCIDENT WITH ITS STRUCTURAL AXIS ORIGIN.

AXIS	AXIS SYMBOL	MOMENT SYMBOX	POSITIVE* ROTATION	LAUNCH VEHICLE ANGLE	CSM ANGLE	LM ANGLE	ANGLE SYMBOL	LINEAR VELOCITY	ANGULAR VELOCITY
LONGITUDINAL	X	L	+Y TO +Z	ROLL	ROLL	ROLL	ϕ	u	p
TRANSVERSE (PITCH)	Y	M	+Z TO +X	PITCH	PITCH	PITCH	θ	v	q
TRANSVERSE (YAW)	Z	N	+X TO +Y	YAW	YAW	YAW	ψ	w	r

*POSITIVE ROTATIONS ARE DEFINED USING AXES FOR VEHICLE BEING CONSIDERED $\theta CSM=-\theta LV, \psi CSM=-\psi LV$

FIGURE 2-1. VEHICLE COORDINATE AXES AND NOTATION SYSTEM

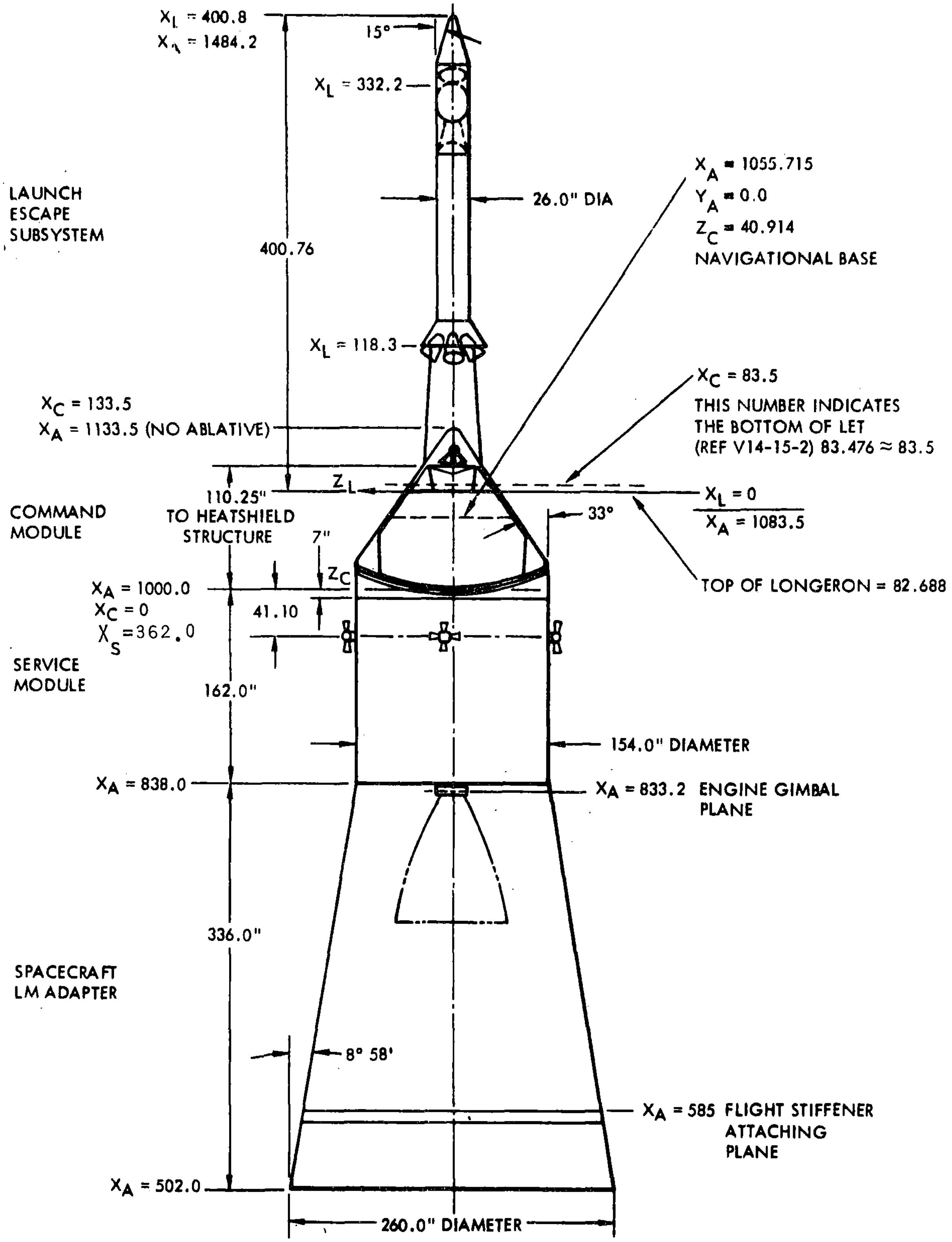


FIGURE 2-2. APOLLO SPACECRAFT REFERENCE DIMENSIONS

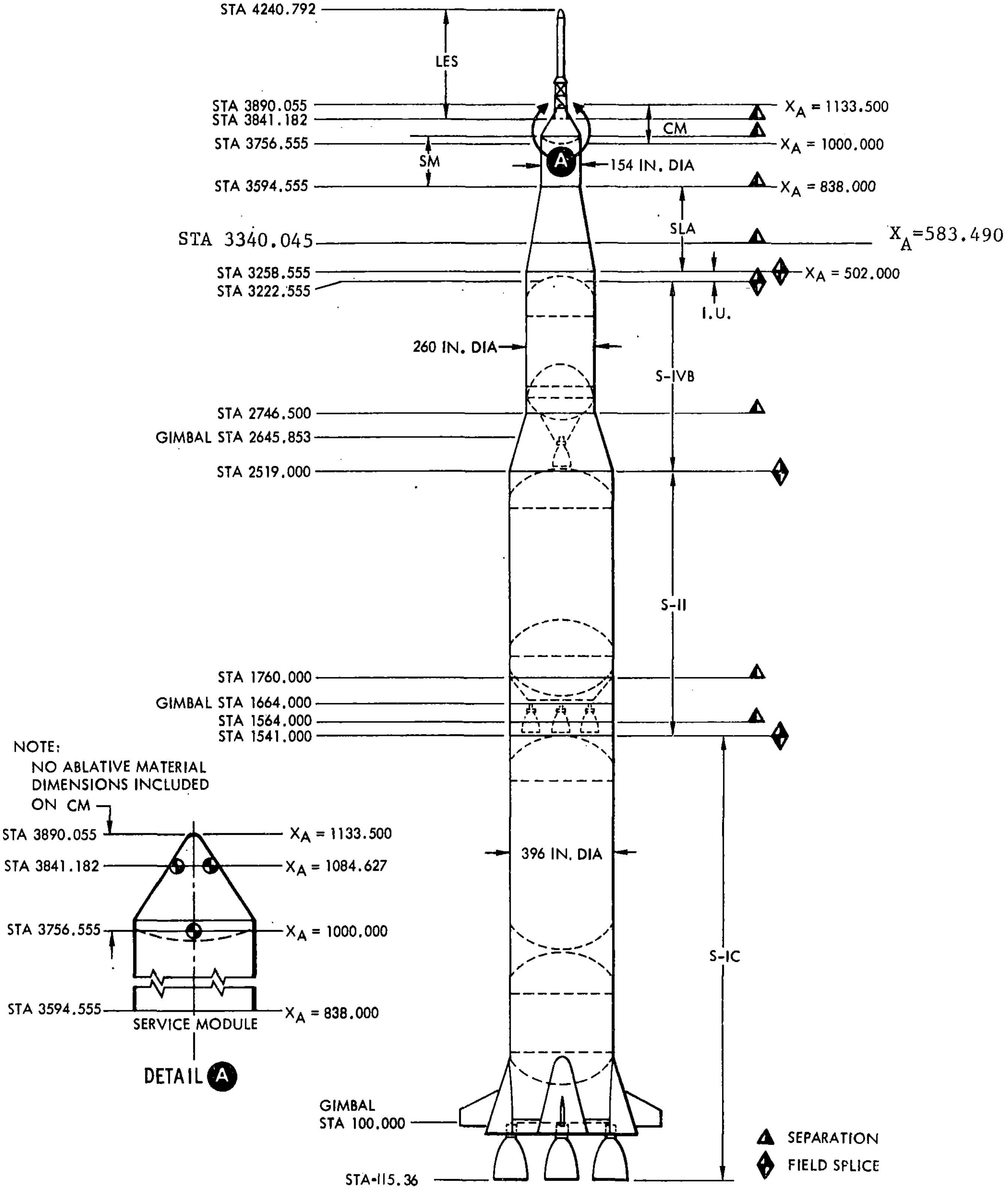


FIGURE 2-3. SATURN V/APOLLO CONFIGURATION

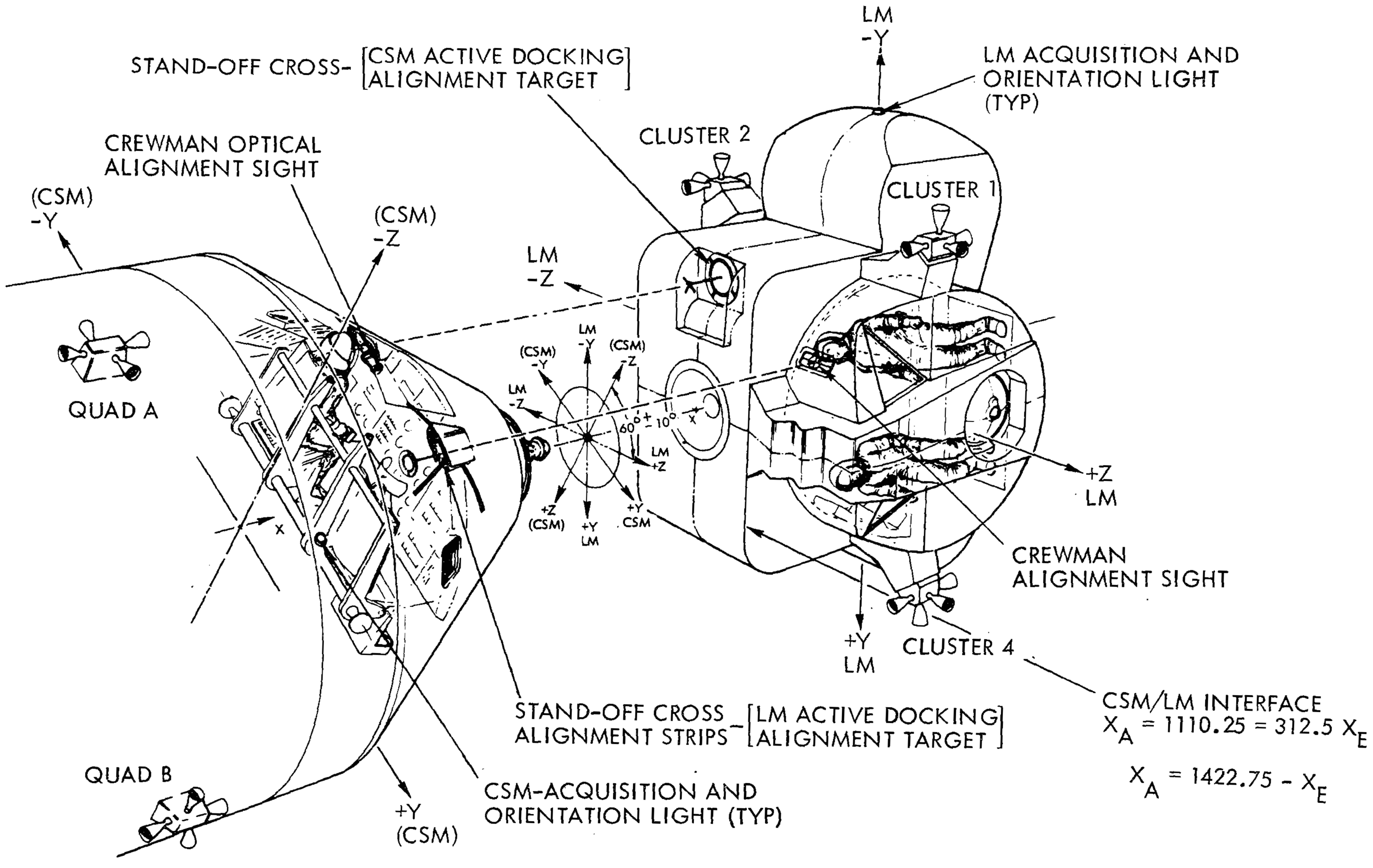

LM
-Y
STAND-OFF CROSS- [CSM ACTIVE DOCKING ALIGNMENT TARGET]
LM ACQUISITION AND ORIENTATION LIGHT (TYP)
CLUSTER 2
CREWMAN OPTICAL ALIGNMENT SIGHT
CLUSTER 1
(CSM) -Y
(CSM) -Z
LM -Z
QUAD A
LM -Y
(CSM) -Y
(CSM) -Z
LM -Z
60° ± 10°
X
LM +Z
+Z (CSM)
+Y LM
+Y CSM
+Z LM
X
CREWMAN ALIGNMENT SIGHT
+Y LM
CLUSTER 4
STAND-OFF CROSS ALIGNMENT STRIPS - [LM ACTIVE DOCKING ALIGNMENT TARGET]
CSM/LM INTERFACE
$X_A = 1110.25 = 312.5\ X_E$
$X_A = 1422.75 - X_E$
QUAD B
+Y (CSM)
CSM-ACQUISITION AND ORIENTATION LIGHT (TYP)

FIGURE 2-4. LM/CSM DOCKED ORIENTATION

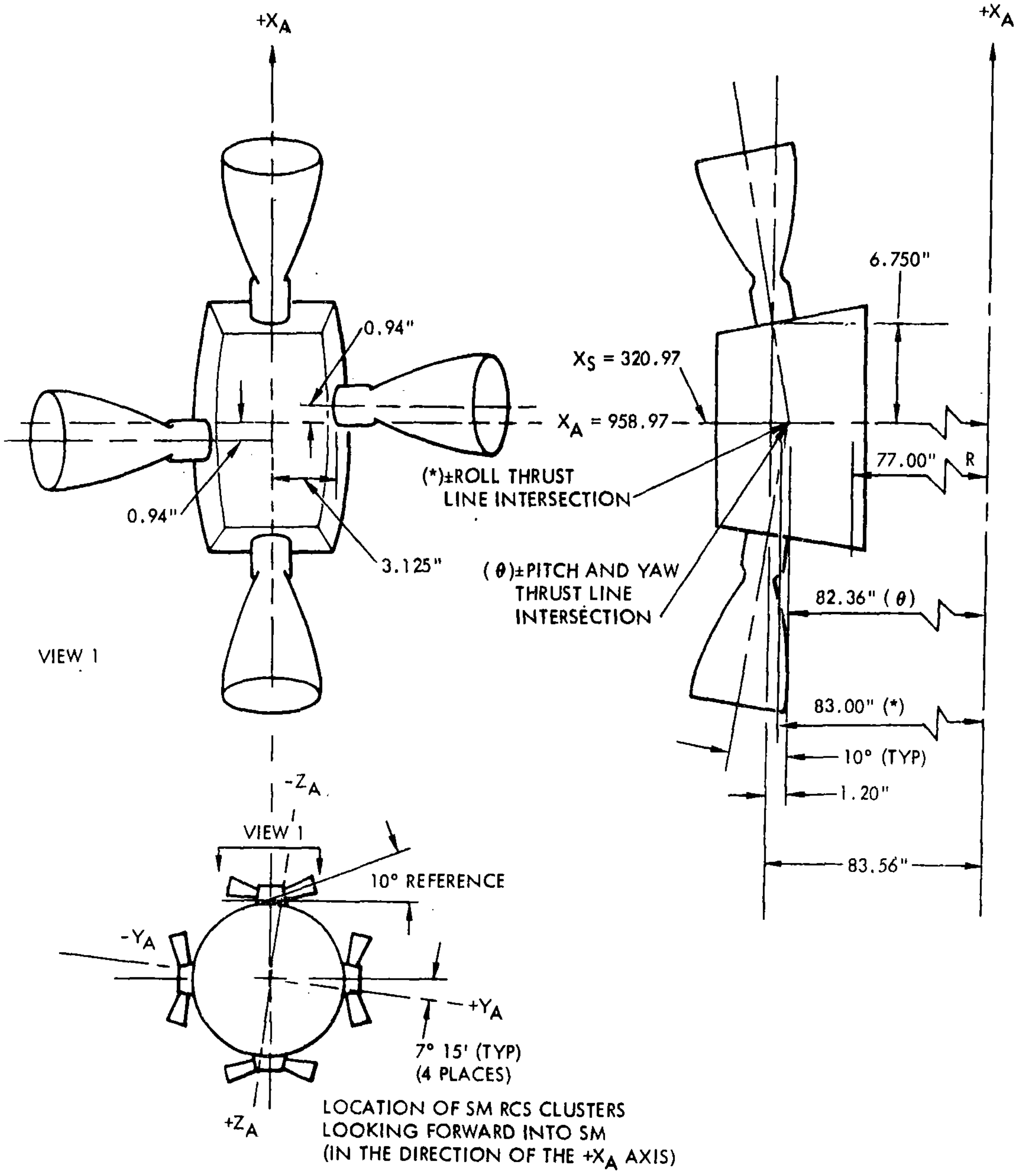
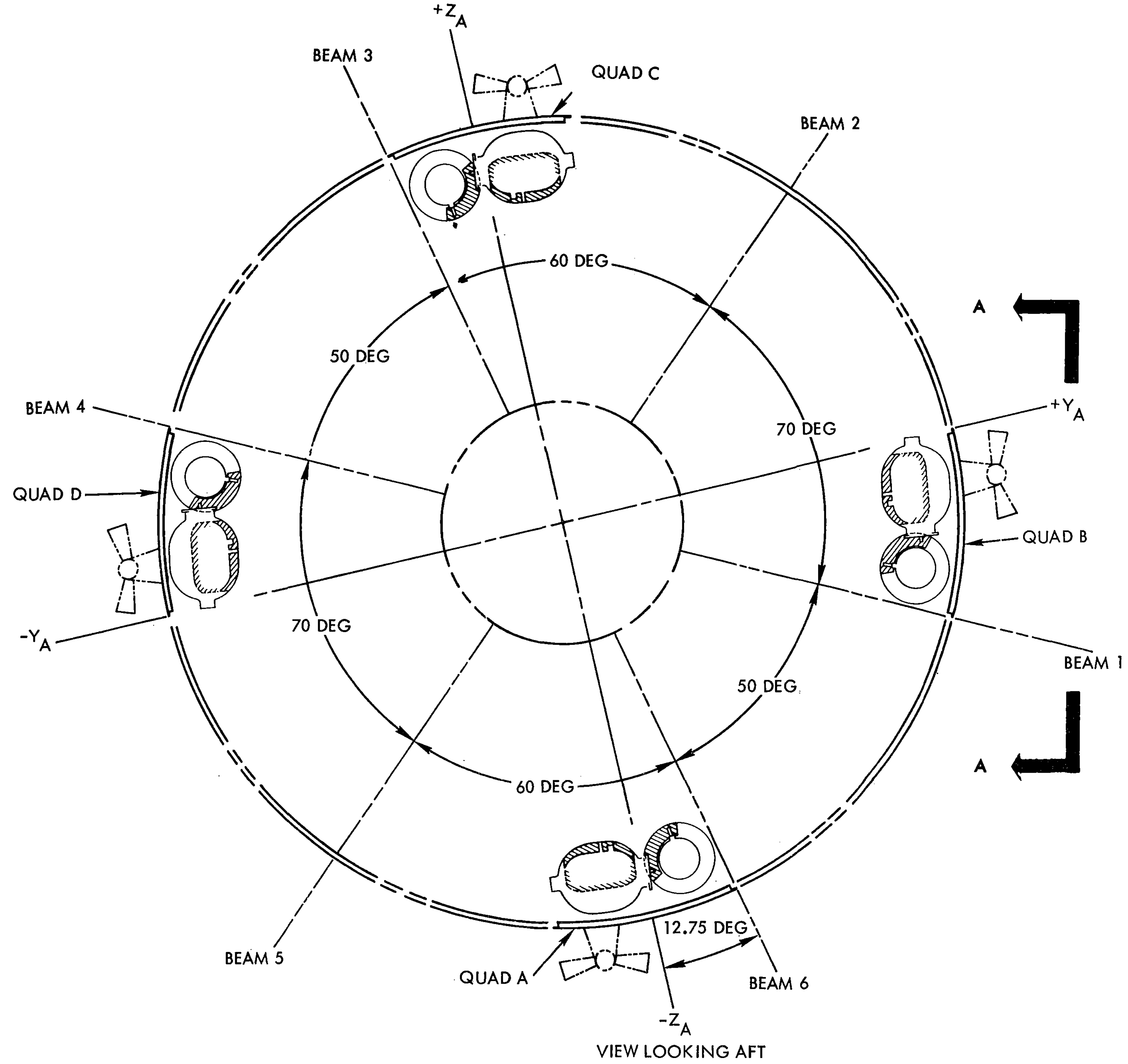


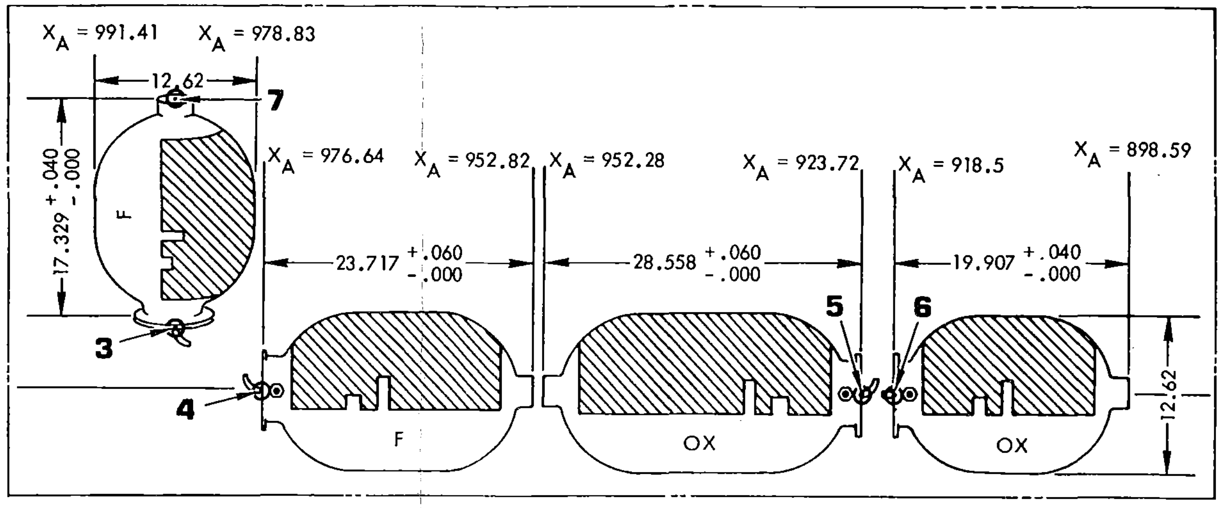
FIGURE 2-5. SERVICE MODULE RCS THRUST CHAMBER LOCATIONS



VIEW LOOKING AFT

SM RCS QUAD A AND C

TANK POINT NUMBER	Y_A		Z_A	
	QUAD A	QUAD C	QUAD A	QUAD C
3	+1.708	-1.708	-69.818	+69.818
4	+7.346	-7.346	-68.688	+68.688
5	+7.346	-7.346	-68.688	+68.688
6	+7.346	-7.346	-68.688	+68.688
7	-15.535	+15.535	-68.083	+68.083



FWD

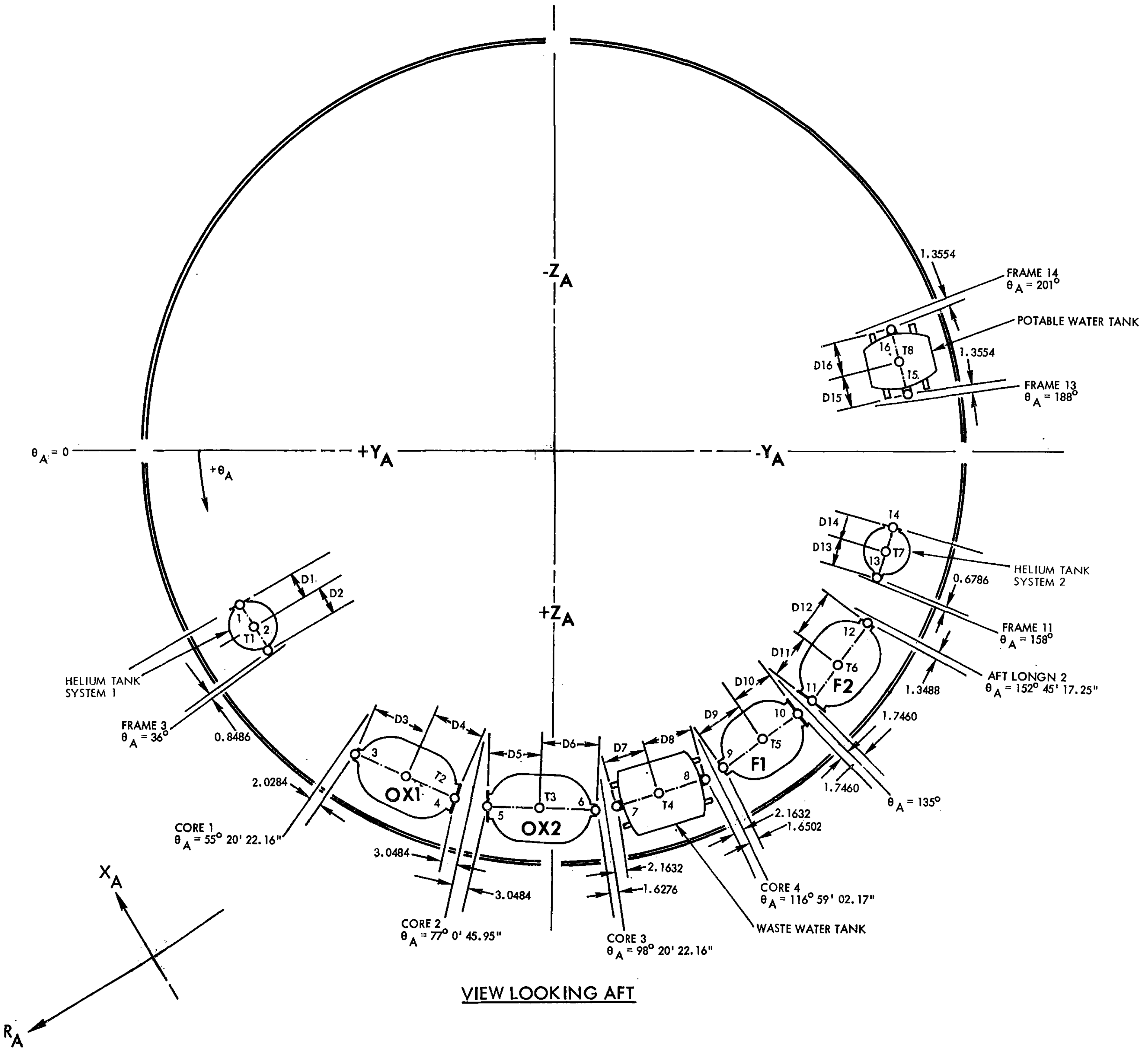
VIEW A-A

(POINTS 1 AND 2 OMITTED)
HELIUM TANK NOT SHOWN FOR CLARITY

SM RCS QUAD B AND D

TANK POINT NUMBER	Y_A		Z_A	
	QUAD B	QUAD D	QUAD B	QUAD D
3	+67.171	-67.171	-19.123	+19.123
4	+64.665	-64.665	-24.300	+24.300
5	+64.665	-64.665	-24.300	+24.300
6	+64.665	-64.665	-24.300	+24.300
7	+69.805	-69.805	-1.995	+1.995

FIGURE 2-6. SM/RCS TANK LOCATIONS IN CSM (X_A) COORDINATE SYSTEM



*OXIDIZER AND FUEL TANKS HAVE DIAMETER OF 12.62 INCHES

*ALL DIMENSIONS GIVEN IN INCHES

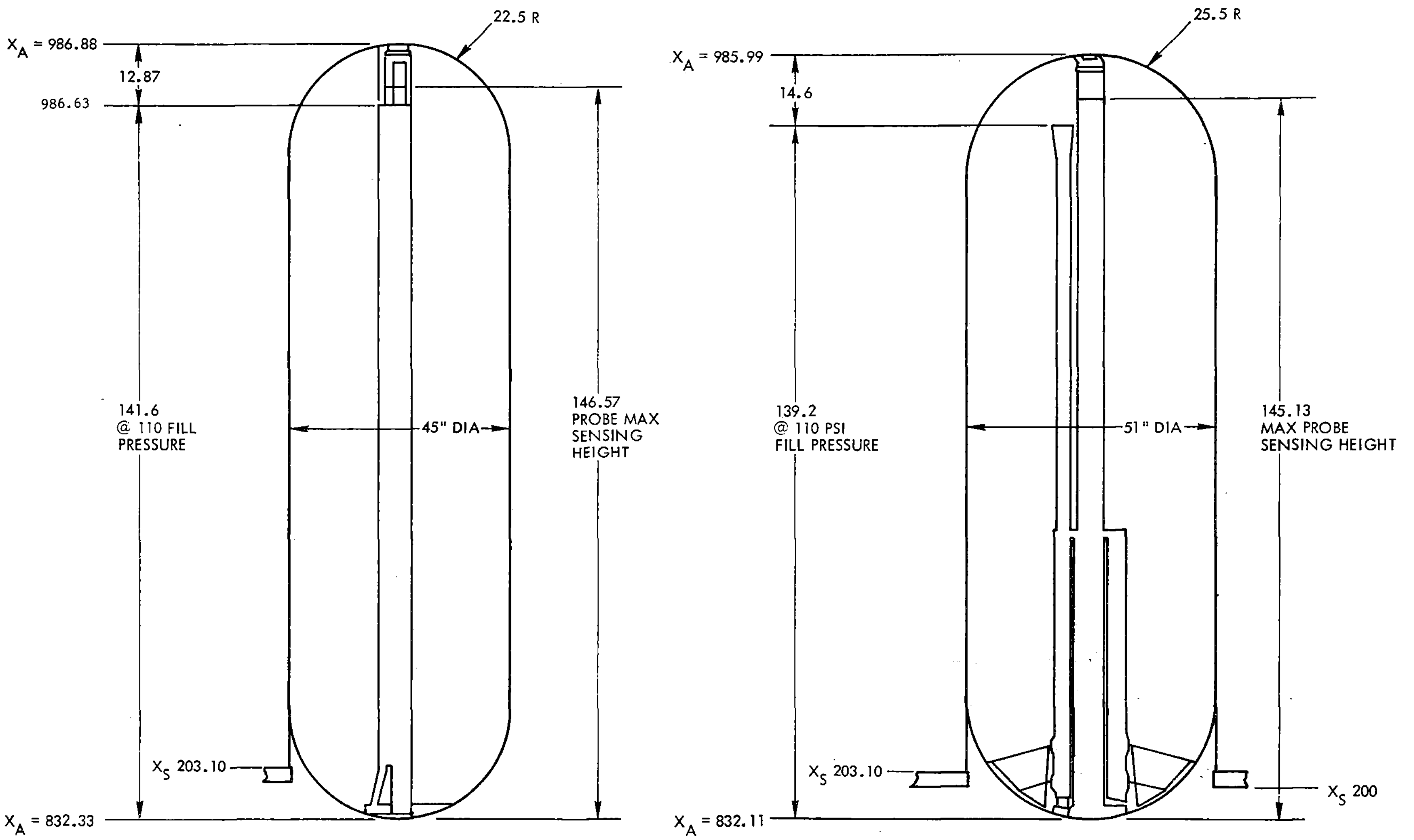
OX1 - SYSTEM 1 OXIDIZER TANK
OX2 - SYSTEM 2 OXIDIZER TANK
F1 - SYSTEM 1 FUEL TANK
F2 - SYSTEM 2 FUEL TANK

PT	X_A	Y_A	Z_A
1	1022.6000	57.3372	28.8372
2	↑	52.4137	37.0319
3		36.0214	55.6649
4		17.8326	63.7554
5		11.8917	65.1255
6		-8.0033	65.8185
7		-11.7159	65.0097
8		-28.0290	59.8155
9		-31.4605	58.1506
10		-45.4375	47.9067
11		-47.9067	45.4375
12		-58.1506	31.4605
13		-59.7521	23.4095
14		-62.5468	14.2672
15	↓	-65.0403	-10.5095
16	1022.6000	-61.9807	-22.3403

	DISTANCE
D_1	4.8100
D_2	4.7500
D_3	10.2895
D_4	9.6175
D_5	9.6175
D_6	10.2895
D_7	8.5600
D_8	8.5600
D_9	9.0005
D_{10}	8.3285
D_{11}	8.3285
D_{12}	9.0005
D_{13}	4.7500
D_{14}	4.8100
D_{15}	6.1100
D_{16}	6.1100

PT	X_A	Y_A	Z_A	R_A	θ_A
T1	1022.6000	54.8600	32.9603	64.0000	30° 59' 51.90"
T2	↑	26.6200	59.8467	65.5000	66° 09' 13.25"
T3		2.2800	65.4603	65.5000	88° 00' 18.64"
T4		-19.8725	62.4126	65.5000	107° 39' 42.17"
T5		-38.7200	52.8300	65.5000	126° 14' 17.90"
T6		-52.8300	38.7200	65.5000	143° 45' 42.10"
T7	↓	-61.1407	18.8670	63.9855	162° 51' 02.14"
T8	1022.6000	-63.5105	-16.4249	65.6000	194° 30'

FIGURE 2-7. CM/RCS TANK LOCATIONS IN APOLLO (X_A) COORDINATE SYSTEM

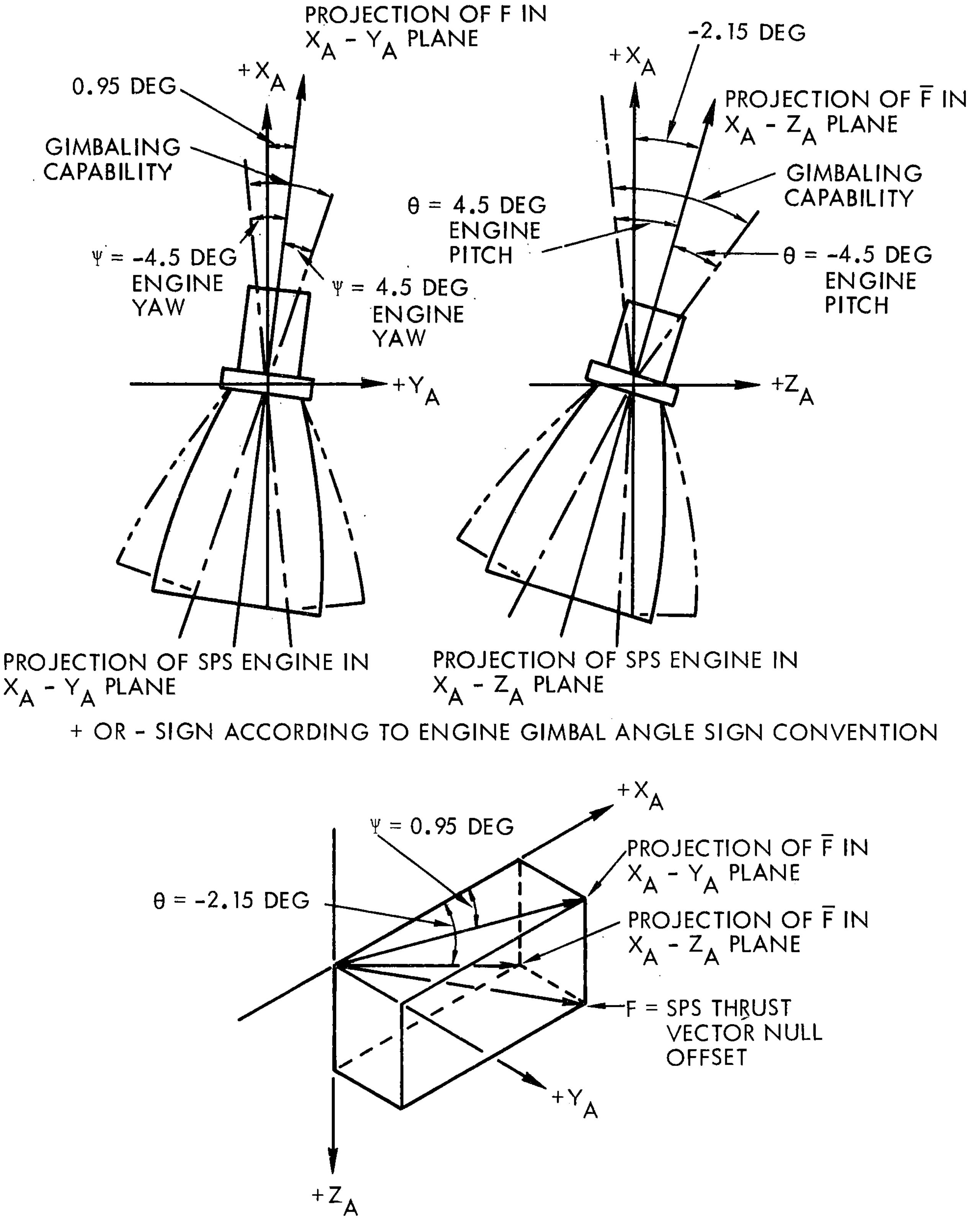


STORAGE TANK
128.58 CUBIC FEET

SUMP TANK
161.72 CUBIC FEET

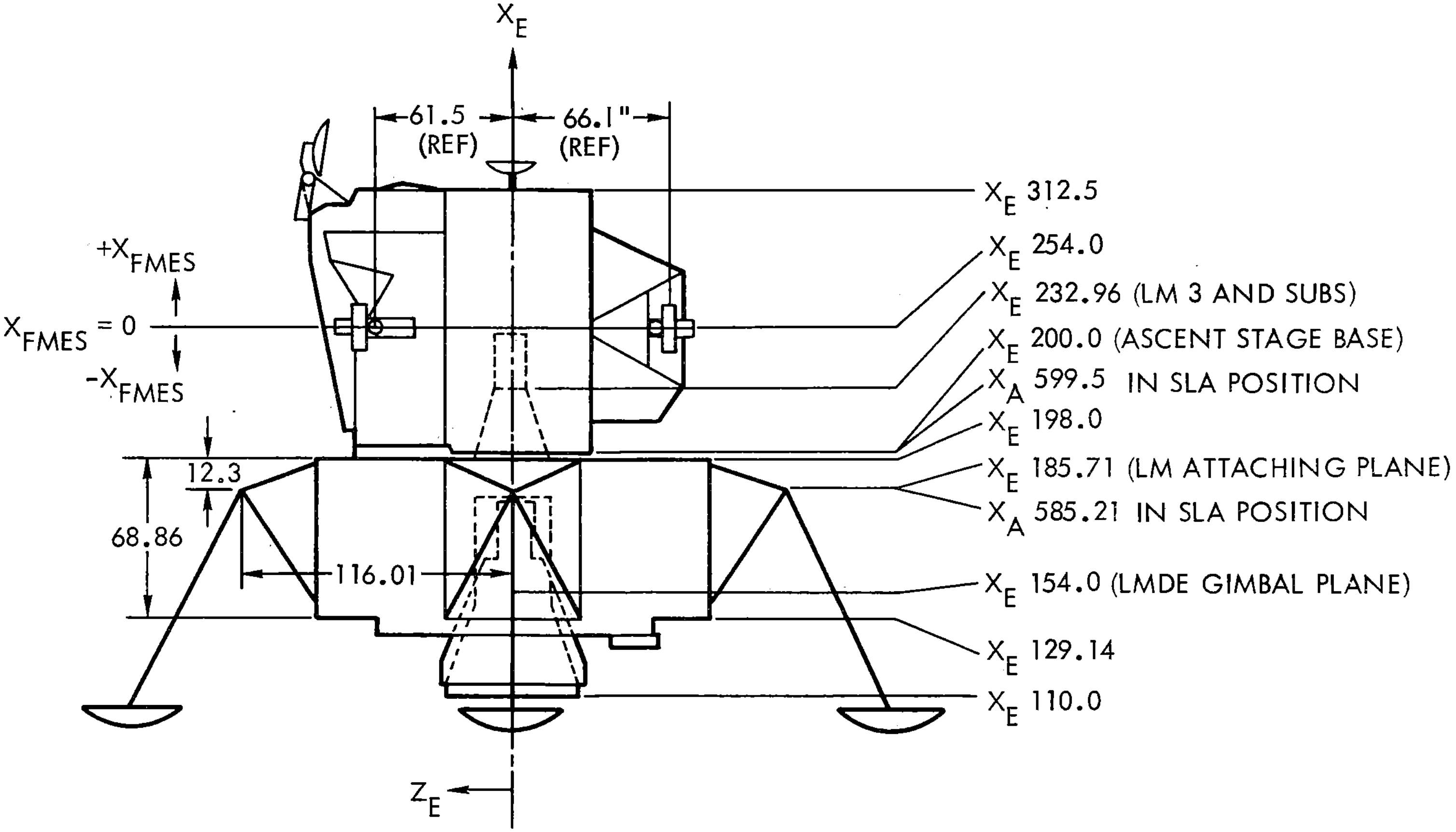
*VOLUME IN UNSTRETCHED CONDITION (70F)

FIGURE 2-8. SPS TANK DIMENSIONS


PROJECTION OF F IN X_A - Y_A PLANE
0.95 DEG
+X_A
GIMBALING CAPABILITY
Ψ = -4.5 DEG ENGINE YAW
Ψ = 4.5 DEG ENGINE YAW
+Y_A
PROJECTION OF SPS ENGINE IN X_A - Y_A PLANE
-2.15 DEG
+X_A
PROJECTION OF $\bar{F}$ IN X_A - Z_A PLANE
GIMBALING CAPABILITY
θ = 4.5 DEG ENGINE PITCH
θ = -4.5 DEG ENGINE PITCH
+Z_A
PROJECTION OF SPS ENGINE IN X_A - Z_A PLANE
+X_A
Ψ = 0.95 DEG
θ = -2.15 DEG
PROJECTION OF $\bar{F}$ IN X_A - Y_A PLANE
PROJECTION OF $\bar{F}$ IN X_A - Z_A PLANE
F = SPS THRUST VECTOR NULL OFFSET
+Y_A
+Z_A

+ OR - SIGN ACCORDING TO ENGINE GIMBAL ANGLE SIGN CONVENTION

FIGURE 2-9. SPS THRUST VECTOR ORIENTATION


X_E
61.5 (REF)
66.1" (REF)
$+X_{FMES}$
$X_{FMES} = 0$
$-X_{FMES}$
12.3
68.86
116.01
X_E 312.5
X_E 254.0
X_E 232.96 (LM 3 AND SUBS)
X_E 200.0 (ASCENT STAGE BASE)
X_A 599.5 IN SLA POSITION
X_E 198.0
X_E 185.71 (LM ATTACHING PLANE)
X_A 585.21 IN SLA POSITION
X_E 154.0 (LMDE GIMBAL PLANE)
X_E 129.14
X_E 110.0
Z_E

NOTE: X_E = LM COORDINATE SYSTEM

X_A = APOLLO SPACECRAFT COORDINATE SYSTEM

ALL LINEAR DIMENSIONS ARE IN INCHES

RCS PITCH AND ROLL JETS Z_E AND $Y_E = \pm 66.1$ (EFFECTIVE GEOMETRIC MOMENT ARM)

RCS YAW JETS Z_E AND $Y_E = \pm 61.5$ (EFFECTIVE GEOMETRIC MOMENT ARM)

FIGURE 2-12. LM REFERENCE DIMENSIONS

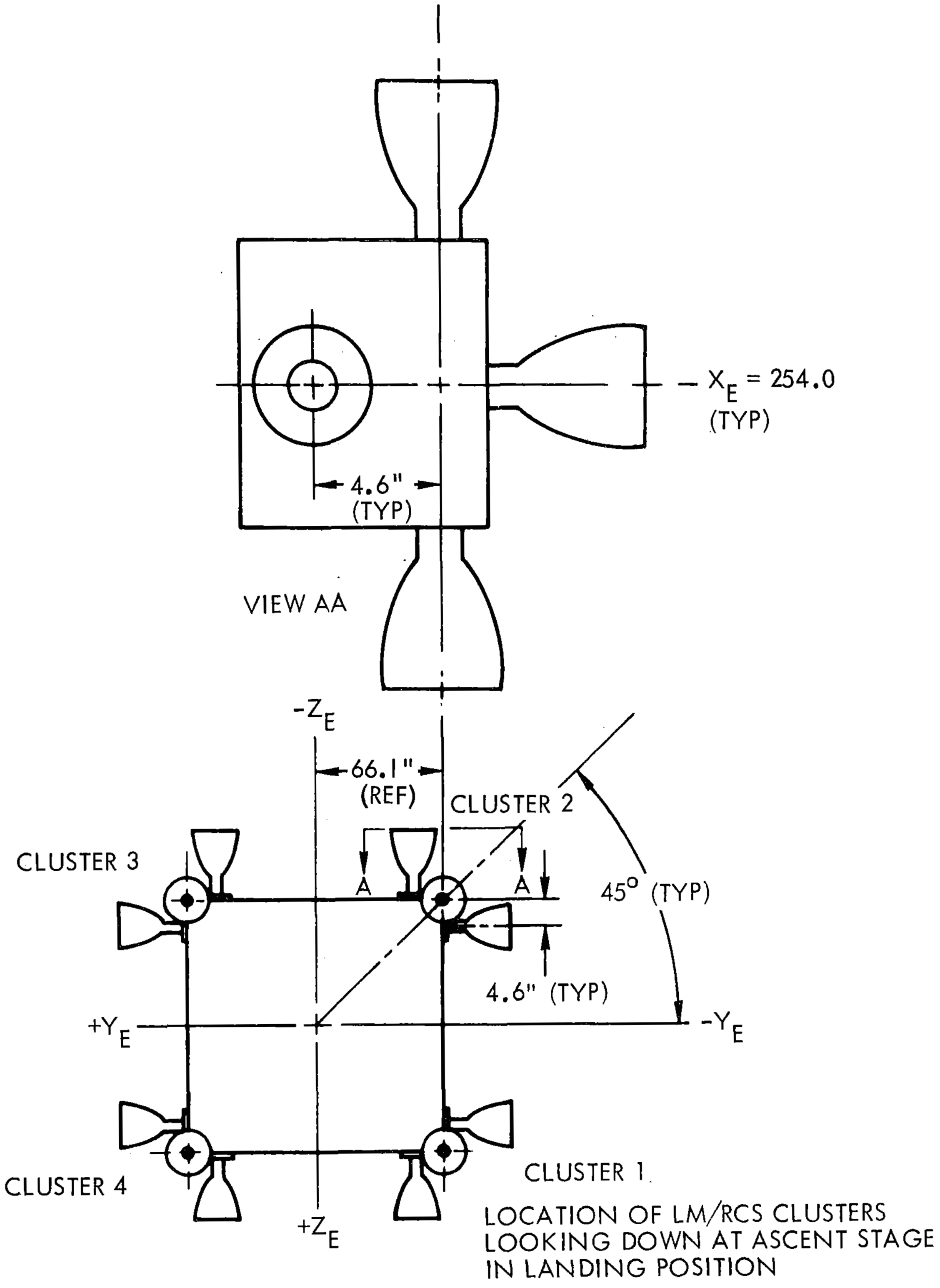
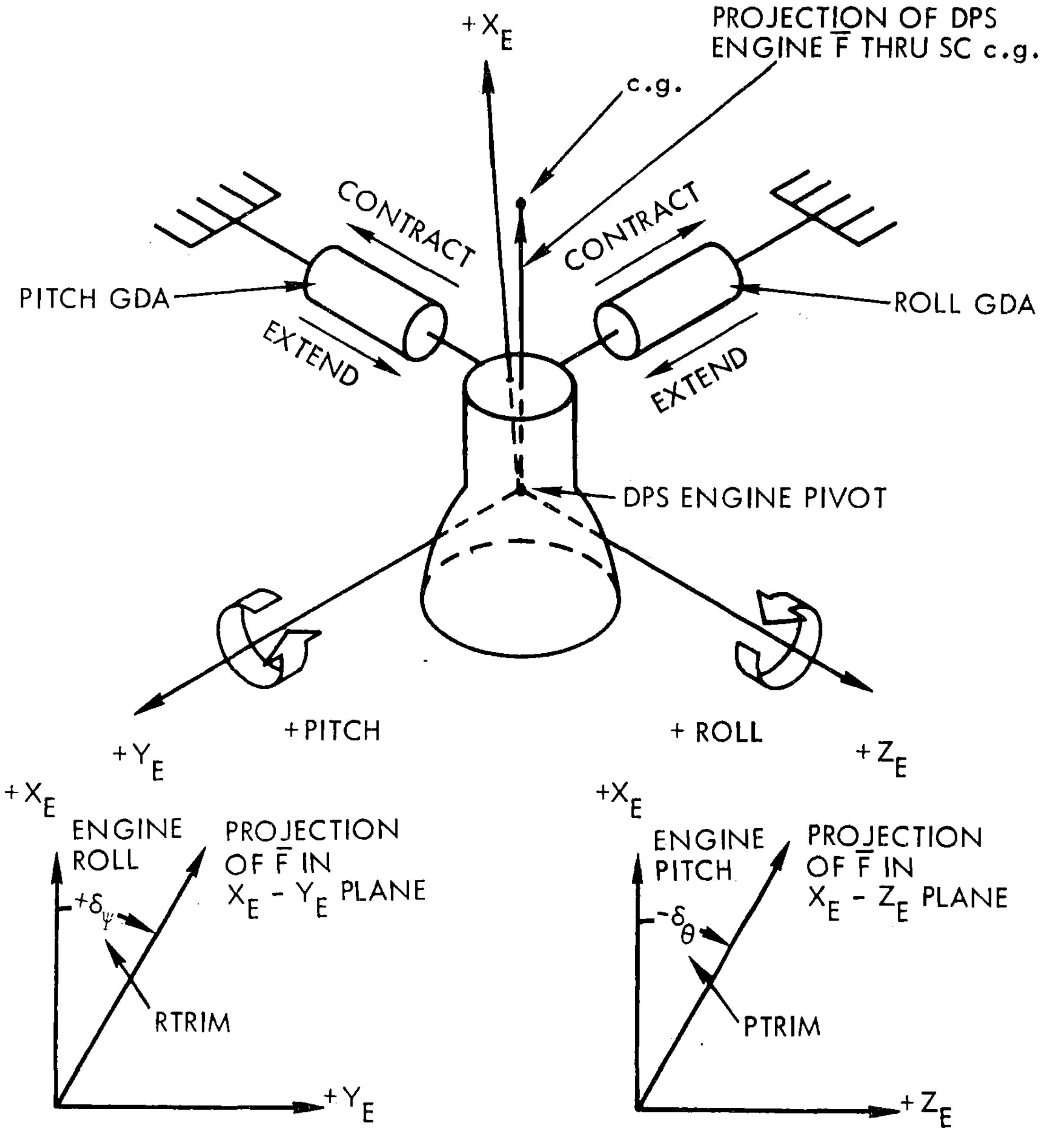


FIGURE 2-13. LM/RCS THRUST CHAMBER LOCATIONS

(GDA) Actuator Response	Rotation of Engine	Commanded Change Vehicle Angular Acceleration	
Extend	$-\ \delta\theta$	+	Pitch
Contract	$+\ \delta\theta$	-	Pitch
Contract	$-\ \delta\psi$	+	Roll
Extend	$+\ \delta\psi$	-	Roll



+ OR - SIGN ACCORDING TO ENGINE GIMBAL ANGLE SIGN CONVENTION

FIGURE 2-14. SIGN CONVENTION FOR DPS GIMBAL ANGLE

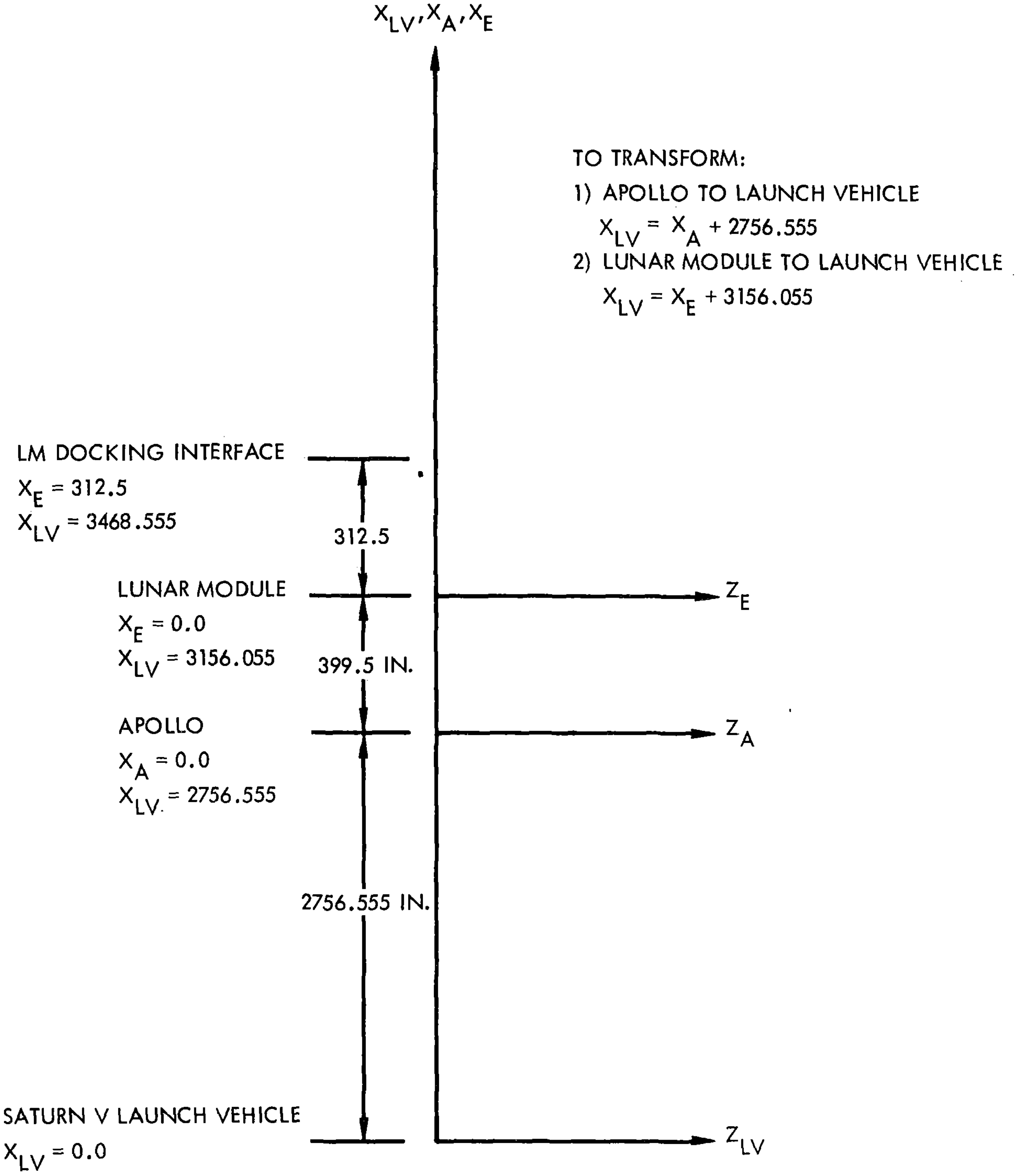
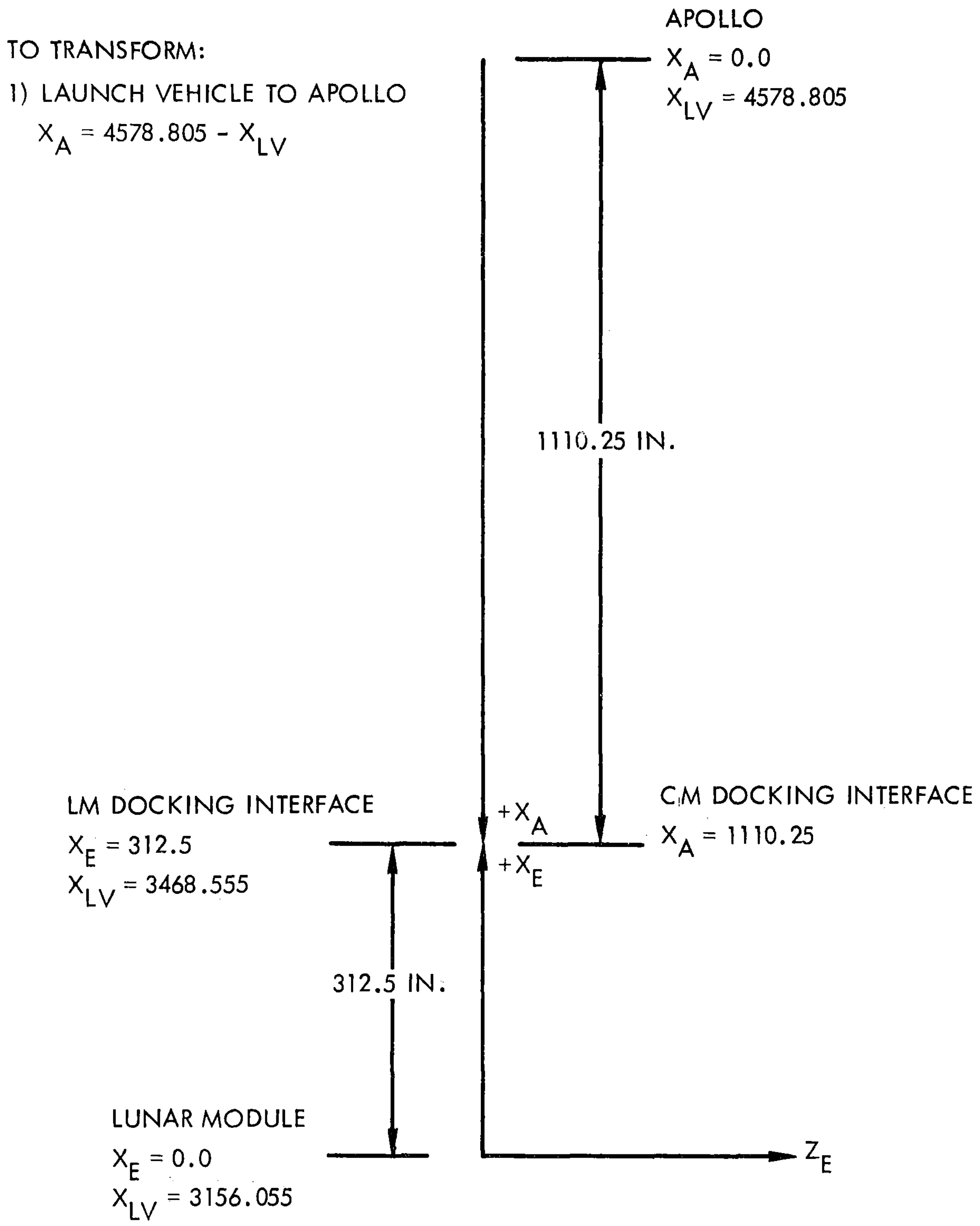


FIGURE 2-15. LAUNCH CONFIGURATION STATION REFERENCE



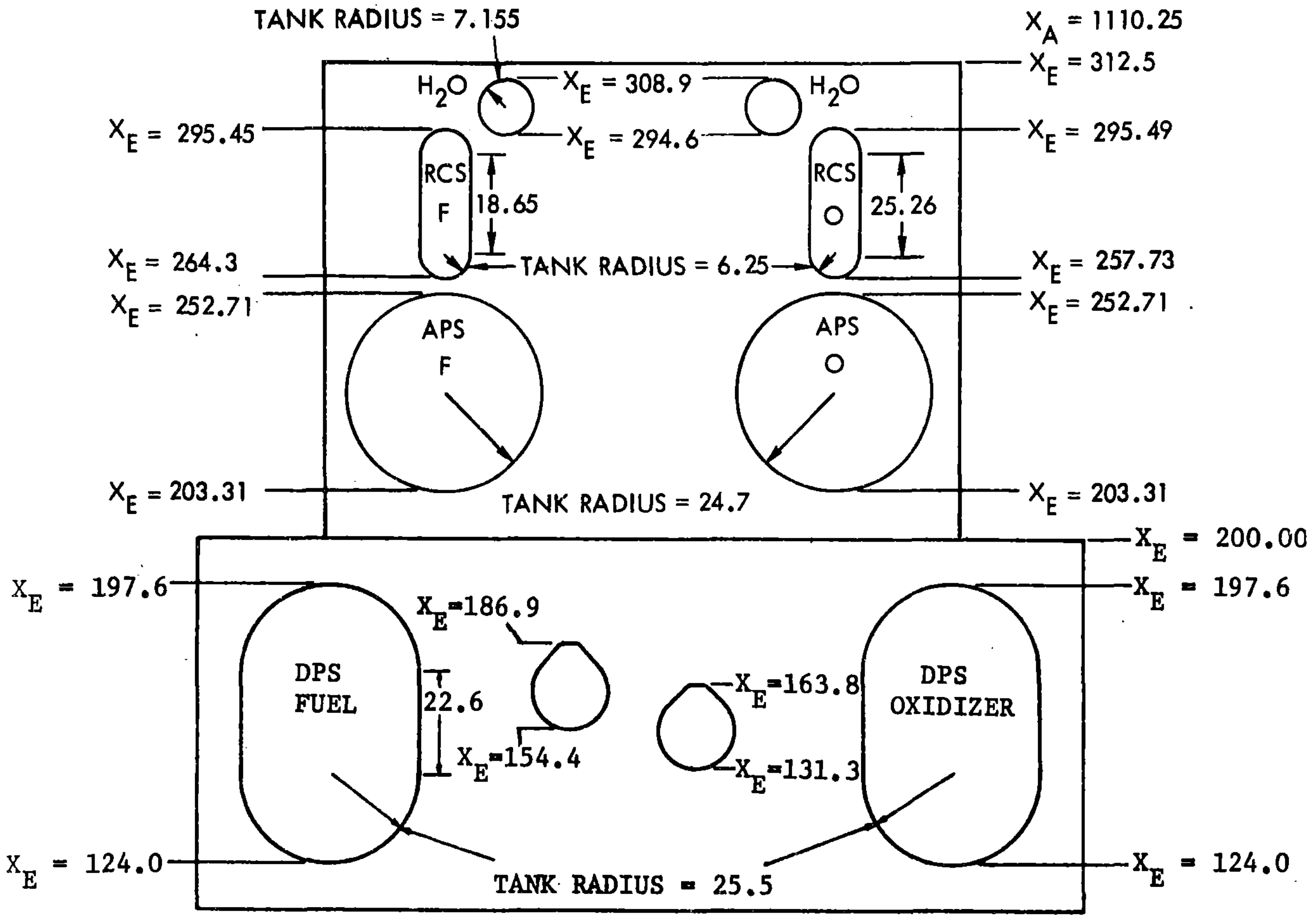
TO TRANSFORM:

1) LAUNCH VEHICLE TO APOLLO

$X_A = 4578.805 - X_{LV}$

FIGURE 2-16. DOCKED CSM/LM STATION REFERENCE

	Y_E	Z_E
A/S WATER (2)	±25.0	±13.7
D/S WATER (2)	±43.2	±43.2
DPS FUEL (2)	±54.0	0.0
DPS OXIDIZER (2)	0.0	±54.0
APS FUEL (1)	-71.3	0.0
APS OXIDIZER (1)	+44.5	0.0
RCS FUEL (2)	±44.5	±14.5
RCS OXIDIZER (2)	±44.5	∓14.5



(NOT TO SCALE)

FIGURE 2-17. LM-10 AND SUBSEQUENT PROPELLANT TANK LOCATIONS IN LM (X_E) COORDINATE SYSTEMS

3.0 SPACECRAFT MASS PROPERTIES AND LOADING DATA BY MISSION

The mass property data specified in this section represent the best prediction of launch configuration mass properties for each spacecraft. The data have been organized logically by Apollo mission and the tables have been organized according to basic mission profile. In addition, data are presented by individual and composite spacecraft to reflect the variation of centers-of-gravity, moments of inertia, and products of inertia as a function of spacecraft weight to enable the user to reasonably predict spacecraft mass properties at any time in the mission profile.

These data represent the composite results of the detailed mass properties data supplied to NASA (MSC-ASPO) by the contractors. Spacecraft mass property data are presented as follows:

1. Section 3.1 Mission J1
2. Section 3.2 Mission J2
3. Section 3.3 Mission J3

SUPPLEMENTARY DATA APPLICABLE TO SEQUENTIAL MASS PROPERTIES TABLES

General Comments to be applied to Tables 3.1-1 through 3.1-8:

Inertia data dispersions are ±10%.

Dispersions shall be used as 3σ deviation values.

All initial propellant weights are total tanked.

The (+) or (-) sign following the name of an item indicates that the item is added to or subtracted from the preceding total.

Table 3.1-1

SM/SPS gimbal angles for SPS abort sequence are: Pitch = -0.581
Yaw = 1.838.

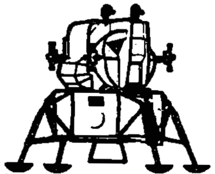
Table 3.1-2

LM propellants are in high end of the tanks, (greatest X-c.g. station), for all docked configuration where the CSM is the controlling vehicle. The Mass Spectrometer and Gamma-Ray Spectrometer are shown deployed after each SPS firing following D.O.I. For all other summations the M.S. and G. R. Spectrometers are not deployed. The following are the individual mass properties for the M.S. and G.R. Spectrometers in Apollo Coordinates.

	Weight (lb)	X-Bar (in)	Y-Bar (in)	Z-Bar (in)
Gamma-Ray Retracted	45.4	865.1	33.0	-57.0
Gamma-Ray Deployed	28.0 17.4	865.1 865.1	231.3 132.2	-312.4 -184.7
Mass Spectrometer Retracted	47.4	863.1	55.8	-40.5
Mass Spectrometer Deployed	27.4 20.0	863.1 863.1	341.7 198.8	-149.4 -94.9

Tables 3.1-7 and 3.1-8

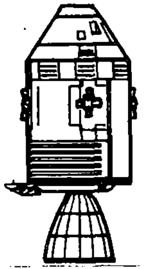
CSM and LM consumables changes are presented in Tables 3.1-7 and 3.1-8, respectively.



XE COORDINATES

TABLE 3.1-1
LM-10 EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
ASCENT STAGE	+	4727.9	257.5	-.2	2.9	2736	2625	1528	-16	115	59	25.0	1.0	.5	.5
LM RCS FUEL	+	102.1	279.1	44.6	14.5	0	0	0	0	0	0	1.0	1.0	.1	.1
LM RCS FUEL	+	102.2	279.1	-44.6	-14.5	0	0	0	0	0	0	1.0	1.0	.1	.1
LM RCS OXY	+	200.3	275.4	-44.6	14.5	0	1	1	0	0	0	2.0	1.0	.1	.1
LM RCS OXY	+	200.3	275.4	44.6	-14.5	0	1	1	0	0	0	2.0	1.0	.1	.1
LM APS FUEL	+	2011.3	228.0	-71.3	.0	0	0	0	0	0	0	5.4	1.0	.5	.5
LM APS OXY	+	3217.4	228.0	44.5	.0	0	0	0	0	0	0	8.7	1.0	.5	.5
ASCENT STAGE		10561.5	244.0	-.1	1.3	6610	3275	5988	-18	154	31	27.2	.6	.3	.3
DESCENT STAGE	+	6139.0	156.8	2.7	-7.6	6541	4591	3560	107	-53	172	25.0	1.0	.5	.5
LM DPS FUEL	+	3756.7	160.4	54.0	.0	0	7	7	0	0	0	7.1	1.0	.5	.5
LM DPS FUEL	+	3756.7	160.4	-54.0	.0	0	7	7	0	0	0	7.1	1.0	.5	.5
LM DPS OXY	+	5596.4	160.4	.0	54.0	0	12	12	0	0	0	12.7	1.0	.5	.5
LM DPS OXY	+	5996.5	160.4	.0	-54.0	0	12	12	0	0	0	12.7	1.0	.5	.5
DESCENT STAGE		25645.3	159.5	.6	-1.8	18883	12251	8350	97	-25	151	32.4	.5	.2	.2
LM AT EARTH LAUNCH		36206.8	184.2	.4	-.9	25510	27057	25853	-24	554	178	42.3	.4	.2	.2

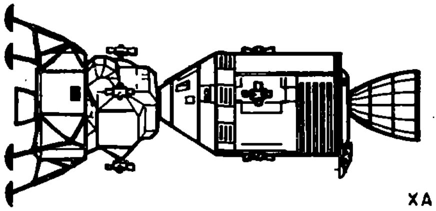


XA COORDINATES

TABLE 3.1-1 (CONTINUED)

CSM 112/LM10 EXPECTED SEQUENTIAL MASS PROPERTIES

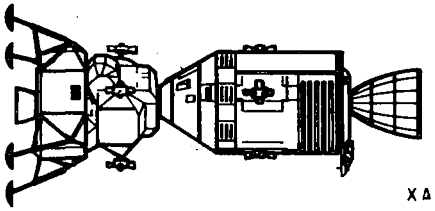
DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
SLA RING	+	98.0	835.7	2.0	-6.6	120	65	56	0	0	0	.0	.0	.0	.0
SERVICE MODULE	+	13473.0	917.8	1.1	1.8	9551	14216	12976	-84	367	-1726	25.0	1.0	.5	.5
COMMAND MODULE	+	12822.0	1041.1	-.2	5.6	5963	5498	4926	49	-426	2	25.0	1.0	.5	.5
CSM LESS SPS PROPELLANT		26393.0	977.4	.5	3.6	15659	41785	39944	-266	636	-1731	35.4	.7	.4	.4
SM SPS F-STORE	+	6756.7	904.0	-14.8	-47.8	0	1915	1915	0	0	0	59.0	1.0	.5	.5
SM SPS O-STORE	+	10768.9	903.9	14.8	47.8	0	3047	3047	0	0	0	121.0	1.0	.5	.5
SM SPS F-SUMP	+	8868.7	906.8	-48.3	-6.6	0	2608	2608	0	0	0	59.0	1.0	.5	.5
SM SPS O-SUMP	+	14199.4	907.0	48.3	6.6	0	4210	4210	0	0	0	121.0	1.0	.5	.5
SM WITH SPS PROPELLANT		54164.7	908.5	6.1	4.6	30299	35136	37276	-176	223	2211	192.0	.5	.3	.3
CSM AT EARTH LAUNCH		66986.7	933.9	4.9	4.8	36354	79959	81614	-2004	86	2199	193.6	.4	.2	.2



XA COORDINATES

TABLE 3.1-2
CSM 112/LM10 EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
CSM AT EARTH LAUNCH		66986.7	933.9	4.9	4.8	36354	79959	81614	-2004	86	2199	193.6	.4	.2	.2
LM AT EARTH LAUNCH		36206.8	583.7	.4	-.9	25510	27057	25853	-24	554	178	42.3	.4	.2	.2
SLA (EXCLUDING RING)		3960.9	638.9	.6	-.2	9996	12495	12470	-47	116	28	25.0	1.0	.5	.5
LES		9172.7	1300.9	.0	-.9	821	28513	28492	7	493	0	25.0	1.0	.5	.5
CSM+LM+SLA+LES AT LAUNCH		116327.1	843.8	3.0	2.4	73006	1243977	1244313	3366	8592	2564	201.3	.3	.2	.2
CSM+LM+SLA AT E.O.I.		107154.4	804.7	3.2	2.7	72142	766352	766714	6290	11351	2543	199.8	.4	.2	.2
CSM+LM+SLA PRE TRANS/DOCK		107131.3	804.6	3.2	2.7	72132	766263	766628	6300	11339	2547	199.8	.4	.2	.2
CSM AT TRANS/DOCK		66893.0	933.9	4.9	4.8	36268	79902	81569	-2007	89	2221	193.6	.4	.2	.2
LM AT TRANS/DOCK		36204.1	1238.1	-.6	.8	25505	25891	26807	-470	302	-432	42.3	.4	.3	.1
CSM/LM DOCKED		103097.1	1040.7	3.0	3.4	62008	575057	577712	-10968	-5767	1900	198.2	.4	.2	.2
CM EQUIP.RELOC.1	-	531.7	1042.6	-9.1	-11.5	37	7	33	0	1	2	.0	.0	.0	.0
CM EQUIP.RELOC.1	+	531.7	1034.7	-8.7	-13.5	31	33	42	-8	7	-2	.0	.0	.0	.0
SIM DOOR	-	160.0	912.1	43.2	-59.5	20	65	85	0	0	0	.0	.0	.0	.0
CM GASEOUS O2	+	6.7	1168.7	13.0	-7.5	0	0	0	0	0	0	.0	.0	.0	.0
CSM/LM PRE L.O.I.		102718.8	1041.2	2.9	3.5	61633	573550	576257	-10811	-6037	2036	198.2	.4	.2	.2
CSM/LM POST L.O.I.		76348.8	1083.5	1.9	2.0	47965	442513	448593	-8348	-1503	-1081	198.2	.7	.2	.2

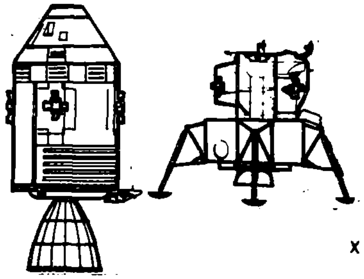


XA COORDINATES

TABLE 3.1-2(CONTINUED)
CSM 112/LM10 EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
CSM/LM PRE D.O.I.		76295.9	1083.6	1.9	2.0	47918	442235	448321	-8349	-1508	-1069	198.2	.7	.2	.2
CSM/LM POST D.O.I.		74730.7	1087.1	1.7	2.1	47128	432866	438190	-7820	-1538	-1169	198.2	.7	.2	.2
DEPLOY M.S. AND G.R.		74730.7	1087.1	1.9	1.9	49173	433717	439384	-8686	-892	-2042	198.2	.7	.2	.2
2 CREW+EQUIP,CM-LM	-	500.6	1042.4	13.0	-10.7	21	4	22	-2	1	-2	.0	.0	.0	.0
EQUIP.XFR,LM-CM 1	+	1.1	1018.0	24.5	-15.0	0	0	0	0	0	0	.0	.0	.0	.0
CM EQUIP.RELOC.2	-	187.6	1018.3	-1.9	-19.9	14	14	12	-2	1	-2	.0	.0	.0	.0
CM EQUIP.RELOC.2	+	187.6	1040.6	-.3	-15.5	22	8	17	0	2	2	.0	.0	.0	.0
LANDING GEAR UP	-	488.0	1306.5	1.1	-.7	740	444	451	-2	1	-6	.0	.0	.0	.0
LANDING GEAR DOWN	+	488.0	1303.1	1.6	-.9	1921	1027	1039	-3	2	-10	.0	.0	.0	.0
2 CREW+EQUIP,CM-LM	+	500.6	1170.8	36.6	-21.1	59	43	20	2	1	22	.0	.0	.0	.0
LM EQUIP.RELOC.1	-	46.7	1163.3	-.9	-16.6	7	0	7	0	0	0	.0	.0	.0	.0
LM EQUIP.RELOC.1	+	46.7	1146.1	-9.6	2.6	4	1	2	0	0	-1	.0	.0	.0	.0
EQUIP.XFR,LM-CM 1	-	1.1	1122.7	.0	-.0	0	0	0	0	0	0	.0	.0	.0	.0
CSM/LM AT SEPARATION		74563.6	1098.2	1.8	2.0	48350	432806	438197	-7454	-1843	-1189	198.2	.7	.2	.2

Gamma-Ray and mass spectrometers are not deployed unless specifically stated.

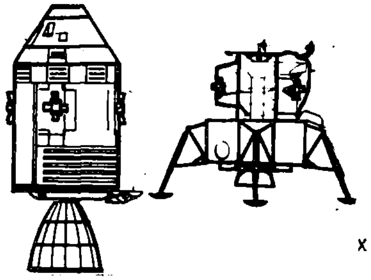


XA COORDINATES

TABLE 3.1-2(CONTINUED)
CSM 112/LM10 EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
CSM PRE CIRC. BURN		37849.1	943.9	3.7	3.5	21310	59946	64334	-2289	1151	-720	193.6	.7	.3	.3
CSM POST CIRC. BURN		37570.3	944.2	3.6	3.5	21171	59897	64151	-2276	1148	-737	193.6	.7	.3	.3
EXPERIMENT JETT SM	-	77.3	886.0	22.0	-50.3	0	0	0	0	0	0	.0	.0	.0	.0
CSM AT SATT. JETT.		37493.0	944.3	3.6	3.6	21117	59792	64089	-2258	1096	-720	193.6	.7	.3	.3
DEPLOY M.S. AND G.R.		37493.0	944.3	4.1	3.2	23155	60652	65267	-2569	1327	-1593	193.6	.7	.3	.3
CSM PRE PLANE CHANGE 1		37250.3	944.4	3.7	3.6	20939	59656	63989	-2272	1115	-664	193.6	.7	.3	.3
CSM POST PLANE CHANGE 1		36117.1	945.5	3.4	3.6	20373	59375	63165	-2206	1097	-734	193.6	.8	.3	.3
DEPLOY M.S. AND G.R.		36117.1	945.5	3.9	3.2	22413	60235	64344	-2522	1332	-1607	193.6	.8	.3	.3
CSM AT ASCT.STAGE DOCKING		36023.1	945.5	3.4	3.6	20274	59314	63116	-2203	1102	-708	193.6	.8	.3	.3
ASCENT STAGE AT DOCKING		5687.0	1164.8	4.1	-2.2	3251	2160	2679	-92	70	-344	27.2	.8	.6	.2
CSM/ASCENT STAGE MANNED		41710.1	975.4	3.5	2.8	23561	112490	116774	-2132	-186	-1057	195.5	.8	.3	.3

Gamma-Ray and mass spectrometers are not deployed unless specifically stated.

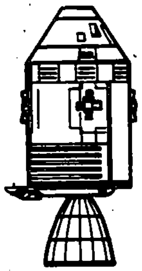


XA COORDINATES

TABLE 3.1-2(CONTINUED)
CSM 112/LM10 EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	CW	DX	DY	DZ
2 CREW+EQUIP,LM-CM	-	714.9	1168.9	23.6	-17.5	144	78	114	25	-7	1	.0	.0	.0	.0
EQUIP.XFR. CM-LM	+	384.5	1151.0	.0	-.0	0	63	63	0	0	0	.0	.0	.0	.0
LM EQUIP.RELOC.3	-	21.4	1122.7	.0	-.0	0	0	0	0	0	0	.0	.0	.0	.0
LM EQUIP.RELOC.3	+	21.4	1204.2	31.4	-40.8	0	0	0	0	0	0	.0	.0	.0	.0
2 CREW+EQUIP,LM-CM	+	714.9	1035.4	9.7	-2.3	81	66	59	4	-11	-12	.0	.0	.0	.0
EQUIP.XFR. CM-LM	-	384.5	1067.2	3.5	11.5	27	189	175	-15	-38	0	.0	.0	.0	.0
CSM/ASCENT STAGE UNMANNED		41699.1	973.9	3.3	3.0	23360	108999	113259	-2700	259	-1020	195.5	.8	.3	.3
CSM POST ASCENT STAGE JFT		36353.5	946.0	3.6	3.4	20333	59205	63020	-2098	968	-727	193.6	.8	.3	.3
DEPLOY M.S. AND G.R.		36353.5	946.0	4.1	3.1	22370	60064	64198	-2416	1205	-1599	193.6	.8	.3	.3
CM EQUIP.RELOC.3	-	194.6	1039.2	-2.1	-12.1	23	9	20	2	0	1	.0	.0	.0	.0
CM EQUIP.RELOC.3	+	194.6	1019.7	5.2	-20.9	31	26	18	-1	4	-9	.0	.0	.0	.0
CSM PRE T.E.I.		36155.0	946.0	3.7	3.3	20205	58982	62790	-2084	977	-696	193.6	.8	.3	.3
CSM POST T.E.I.		26712.5	970.4	1.0	4.0	15456	45442	44686	-651	632	-1273	193.6	1.2	.4	.4
DEPLOY M.S. AND G.R.		26712.5	970.4	1.7	3.5	17515	46304	45883	-1064	939	-2154	193.6	1.2	.4	.4

Gamma-Ray and mass spectrometers are not deployed unless specifically stated.

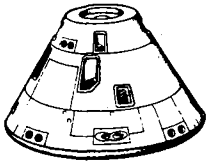


XA COORDINATES

TABLE 3.1-2(CONTINUED)
CSM 112/LM10 EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
CM EQUIP.RELOC.4	-	167.2	1019.2	4.0	-22.4	23	20	14	-2	5	-8	.0	.0	.0	.0
CM EQUIP.RELOC.4	+	167.2	1042.0	-.9	-13.6	18	4	15	0	1	2	.0	.0	.0	.0
CSM PRE EVA		26712.5	970.5	1.0	4.0	15437	45511	44785	-658	629	-1258	193.6	1.2	.4	.4
EQUIP.XFR. SM-CM	-	100.0	931.2	38.9	-53.3	1	13	15	-4	0	0	.0	.0	.0	.0
EQUIP.XFR. SM-CM	+	100.0	1020.4	-23.2	15.4	3	9	6	0	4	0	.0	.0	.0	.0
EVA OFFLOAD	-	32.6	1047.8	-26.7	37.3	0	0	0	0	0	0	.0	.0	.0	.0
CSM POST EVA		26679.9	970.7	.8	4.3	15339	45408	44729	-633	577	-1211	193.6	1.2	.4	.4
CM EQUIP.RELOC.5	-	189.6	1021.1	4.6	-16.3	18	14	20	-1	4	-3	.0	.0	.0	.0
CM EQUIP.RELOC.5	+	189.6	1039.2	-1.8	-15.7	27	12	20	1	1	1	.0	.0	.0	.0
CSM W/PGA STOWED		26679.9	970.9	.7	4.3	15347	45493	44817	-646	560	-1200	193.6	1.2	.4	.4
DEPLOY M.S. AND G.R.		26679.9	970.9	1.4	3.8	17410	46357	46016	-1061	869	-2083	193.6	1.2	.4	.4
CSM PRE CM/SM SEPARATION		26418.0	971.3	.8	4.2	15155	45255	44618	-665	553	-1140	193.6	1.2	.4	.4
SM POST CM/SM SEPARATION		13618.4	906.9	1.8	2.8	9129	14727	14685	-334	455	-1137	192.0	1.4	.7	.7

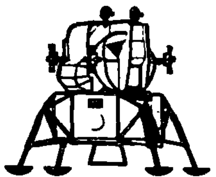
Gamma-Ray and mass spectrometers are not deployed unless specifically stated.



XA COORDINATES

TABLE 3.1-2(CONTINUED)
CSM 112/LM10 EXPECTED SEQUENTIAL MASS PROPERTIES

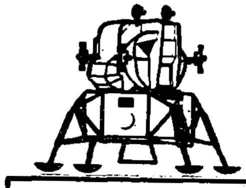
DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
CM POST CM/SM SEPARATION		12799.6	1039.9	-.3	5.8	6007	5322	4733	69	-433	6	25.0	1.0	.5	.5
CM AT ENTRY		12788.0	1039.9	-.3	5.7	6000	5315	4732	69	-431	7	25.0	1.0	.5	.5
ABLATOR BURNOFF	-	150.0	1031.1	.0	7.4	103	81	78	0	0	0	.0	.0	.0	.0
ENTRY COOLING	-	2.0	1022.6	-19.7	62.5	0	0	0	0	0	0	.0	.0	.0	.0
FWD HEAT SHIELD	-	310.0	1094.3	-.5	.8	64	26	23	0	0	0	.0	.0	.0	.0
DROGUE+DISCONNECTS	-	80.0	1089.0	.0	23.9	1	1	0	0	0	0	.0	.0	.0	.0
CM AT MAIN CHUTE DEPLOY		12215.3	1038.3	-.3	5.6	5805	4530	4379	69	-422	10	25.0	1.0	.5	.5
PILOT CHUTE+RISERS	-	45.5	1089.9	5.9	-5.8	2	2	1	0	0	0	.0	.0	.0	.0
MAIN CHUTE	-	401.4	1089.1	.4	8.5	62	22	43	0	0	0	.0	.0	.0	.0
CM RCS DUMP	-	202.7	1022.6	-5.8	57.0	0	0	0	0	0	0	.0	.0	.0	.0
CM AT IMPACT		11565.7	1036.7	-.2	4.6	5619	4519	4066	59	-398	23	25.0	1.1	.6	.6



XE COORDINATES

TABLE 3.1-3
LM-10 EXPECTED SEQUENTIAL MASS PROPERTIES

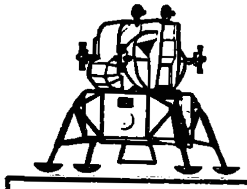
DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
LM AT EARTH LAUNCH		36206.8	184.2	.4	-.9	25510	27057	25853	-24	554	178	42.3	.4	.2	.2
LANDING GEAR UP	-	488.0	116.3	.0	1.3	740	455	441	0	3	0	.0	.0	.0	.0
LANDING GEAR DOWN	+	488.0	119.7	.0	1.8	1921	1046	1021	0	4	0	.0	.0	.0	.0
LM CABLING	-	2.7	209.7	88.8	-25.0	0	0	0	0	0	0	.0	.0	.0	.0
CM GASEOUS O2	+	6.7	254.0	.0	15.0	0	0	0	0	0	0	.0	.0	.0	.0
2 CREW+EQUIP,CM-LM	+	500.6	251.9	.0	42.2	59	6	56	-2	-1	1	.0	.0	.0	.0
LM EQUIP.RELOC.1	-	46.7	259.4	-14.9	7.5	7	6	1	0	0	2	.0	.0	.0	.0
LM EQUIP.RELOC.1	+	46.7	276.7	-2.6	-5.7	4	4	0	0	0	0	.0	.0	.0	.0
EQUIP.XFR,LM-CM 1	-	1.1	300.0	.0	.0	0	0	0	0	0	0	.0	.0	.0	.0
LM AT SEPARATION		36689.3	185.2	.4	-.3	26923	28302	26932	-20	850	172	42.3	.4	.2	.2
LM PRE P.D.I.		36607.2	185.0	.4	-.3	26878	28143	26750	-17	852	167	42.3	.4	.2	.2



XE COORDINATES

TABLE 3.1-3(CONTINUED)
LM-10 EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
DESCENT ABLATION	-	29.0	145.4	.0	.0	0	0	0	0	0	0	.0	.0	.0	.0
HELIUM TRANSFER	-	48.5	148.5	47.2	-47.2	0	0	0	0	0	0	.0	.0	.0	.0
HELIUM TRANSFER	+	48.5	158.6	9.1	-8.7	0	0	0	0	0	0	.0	.0	.0	.0
LM AT TOUCHDOWN		17736.7	210.1	.8	-.6	14987	15836	17127	-76	893	193	42.3	.5	.2	.2
ASCENT STAGE AT TOUCHDOWN		10900.5	243.8	-.1	2.1	6754	3395	5916	-16	185	40	27.2	.6	.3	.3
LEFT AT LUNAR SITE	-	298.9	244.3	-9.0	24.6	40	54	41	-8	-20	6	.0	.0	.0	.0
ONLOAD AT LUN.SITE	+	158.2	263.0	-15.2	-5.0	8	9	9	1	0	-3	.0	.0	.0	.0
LM EQUIP.RELOC.2	-	78.4	251.7	-13.1	15.6	13	16	10	-2	-7	3	.0	.0	.0	.0
LM EQUIP.RELOC.2	+	78.4	247.4	1.7	23.5	13	25	14	0	-11	0	.0	.0	.0	.0
ASCENT STAGE AT LIFTOFF		10754.8	244.0	.1	2.5	6697	3345	5897	-11	195	48	27.2	.6	.3	.3
A/S ABLATION	-	10.0	220.2	.0	.0	0	0	0	0	0	0	.0	.0	.0	.0
ASCENT STAGE IN ORBIT		5850.6	257.4	.1	4.6	3332	2834	2044	-14	118	47	27.2	.8	.4	.4



XE COORDINATES

TABLE 3.1-3(CONTINUED)
LM-10 EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2			DISPERSIONS LB/IN			
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ	DW	DX	DY	DZ
ASCENT STAGE PRE T.P.I.		5798.8	257.2	.1	4.6	3308	2824	2016	-14	119	49	27.2	.8	.4	.4
ASCENT STAGE POST T.P.I.		5766.7	257.4	.1	4.6	3286	2818	1988	-14	118	49	27.2	.8	.4	.4
ASCENT STAGE AT DOCKING		5687.0	257.0	.1	4.7	3251	2803	1947	-14	120	52	27.2	.8	.4	.4
2 CREW+EQUIP,LM-CM	-	714.9	253.8	-3.4	29.2	144	103	88	-5	-25	16	.0	.0	.0	.0
EQUIP.XFR. CM-LM	+	384.5	271.8	.0	.0	0	63	63	0	0	0	.0	.0	.0	.0
LM EQUIP.RELOC.3	-	21.4	300.0	.0	.0	0	0	0	0	0	0	.0	.0	.0	.0
LM EQUIP.RELOC.3	+	21.4	218.5	-19.6	47.6	0	0	0	0	0	0	.0	.0	.0	.0
ASCENT STAGE AT JETTISON		5345.6	258.1	.5	1.3	3009	2676	1928	-7	150	45	27.2	.9	.5	.4

TABLE 3.1-3.1

LRV MASS PROPERTIES - FIRST TRAVERSE

LRV AT DEPARTURE WITH TWO CREW RIDING

DESCRIPTION	STOW. ITEM REF	NO.	STOWAGE LOCATION	WEIGHT	LRV COORDINATES		
					X-C.G.	Y-C.G.	Z-C.G.
LUNAR ROVING VEHICLE	K1000.	1	DEPLOY ON LUN.SURF.	460.9	53.0	-.3	103.0
S-059 BAG,SAMPLE COLLECTION	G4003.1	1	NEAR ZONE A6	1.8	131.8	6.0	118.2
S-059 S.E.S. CONTAINER	G4003.2	1	NEAR ZONE A6	1.0	131.8	6.0	118.2
S-059 (20 BAG)D.S.B.DISPENSER	G4003.3	3	ZONE A10	3.3	84.9	.0	124.5
S-059 CORE TUBES	G4003.4	3	NEAR ZONE A9	1.9	126.5	6.3	115.5
S-059 CAP DISPENSER	G4003.5	1	ZONE A11	.2	128.0	8.0	126.9
S-059 DRILL STEMS	G4003.6	6	NEAR ZONE A6	2.6	131.8	6.0	118.2
S-059 DRILL STEMS CAP+RETAINER	G4003.7	2	NEAR ZONE A6	.3	131.8	6.0	118.2
S-059 TOOL EXTENSION	G4008.	1	ZONE A8	1.7	126.5	-12.5	126.2
S-059 TONGS,32 INCH	G4009.	2	ZONE A7	3.0	127.0	-6.0	126.2
S-059 GNOMON	G4012.	1	ZONE AU3	.6	120.9	2.8	106.4
S-059 LUNAR HAND TOOL CARRIER	G4035.	1	ZONE A2	11.0	128.0	.0	116.4
S-059 SCOOP,ADJUSTABLE SAMPL.	G4035.2	1	ZONE A12	.8	126.5	10.3	117.4
S-059 HAMMER	G4035.3	1	ZONE A9	2.8	126.5	4.0	115.5
S-059 BAG,EXTRA COLLECTION	G4048.	4	ZONE A6	4.8	120.3	11.2	115.9
S-059 RAKE,LUNAR SAMPLING	G4054.	1	NEAR ZONE A13	4.3	120.3	6.5	109.0
S-200 PENTROMETER,RECORDING	G4049.	1	ZONE A4	5.8	122.7	-6.2	108.9
MAGAZINE,16MM DAC	A0101.1	3	ZONE B1	3.0	84.5	-14.5	104.0
MAGAZINE,ELECTRIC HASSELBLAD	A0108.1	3	ZONE B2	4.2	84.5	-14.5	104.0
FILTER,POLARIZING	A1005.	1	CREW STATION - LEFT	.2	84.9	-14.5	124.5
CAMERA,L.S.ELECTRIC HASSELBLAD	A1015.	1	ZONE A10	10.0	84.9	.0	124.5
LENS,60MM	A1016.	1	ZONE A10	3.4	84.9	.0	124.5
TRIGGER,ELECTRIC HASSELBLAD	A1027.	1	ZONE A10	.4	84.9	.0	124.5
HANDLE,ELECTRIC HASSELBLAD	A1028.	1	ZONE A10	1.0	84.9	.0	124.5
BRUSH,LENS	A1042.	2	LEFT OF ZONE A5	.2	120.5	-19.0	116.5
CAM/POWER PACK ASSY,16MM L.S.	A1043.	1	ZONE D1	9.9	62.0	8.0	139.5
BRACKET,CAMERA MOUNT	B1001.1	1	ZONE A10	1.2	84.9	.0	124.5
STAFF,16MM CAMERA/PP	R1001.	1	NEAR ZONE D1	1.5	62.0	8.0	130.0
70MM CAMERA W/500MM LENS		1	ZONE B1	9.3	84.5	-14.5	104.0
TV SYSTEM,LM COLOR	E1001.1	1	ZONE F2	11.3	13.1	14.3	117.9
TV CONTROL UNIT	E1001.2	1	ZONE F2	11.5	13.1	14.3	117.9
CABLE,LCRU/CTV	E1001.4	1	BELOW RT.CREW STA.	1.4	84.5	14.5	104.0

TABLE 3.1-3.1 (CONTINUED)

LRV MASS PROPERTIES - FIRST TRAVERSE

LRV AT DEPARTURE WITH TWO CREW RIDING

DESCRIPTION	STOW. ITEM REF NO.		STOWAGE LOCATION	WEIGHT	LRV COORDINATES X-C.G.	Y-C.G.	Z-C.G.
LCRU,LUNAR COMM,RELAY UNIT	E1002.1	1	ZONE F1	54.4	6.9	.0	108.0
ANTENNA,HIGH GAIN(CABLE+MAST)	E1002.4	1	ZONE F4	10.3	13.9	-14.3	160.0
ANTENNA,LOW GAIN(CABLE+MAST)	E1002.5	1	ZONE E1	2.5	62.0	-8.0	139.8
PALLET,LRV AFT CHASSIS	03067.	1	ZONE A1	32.0	120.1	.3	115.9
LUNAR SURFACE MAPS,LM	A0114.13	1	ZONE A10	1.5	84.9	.0	124.5
CHRONOGRAPH	A0202.	1	CREW STATION - LEFT	.1	84.9	-14.5	124.5
CHRONOGRAPH	A0202.	1	CREW STATION - RIGHT	.1	84.9	14.5	124.5
SUBSYSTEM,FECAL CONTAINMENT	B0113.	1	CREW STATION - LEFT	.3	84.9	-14.5	124.5
SUBSYSTEM,FECAL CONTAINMENT	B0113.	1	CREW STATION - RIGHT	.3	84.9	14.5	124.5
UCTA	B0205.	1	CREW STATION - LEFT	.5	84.9	-14.5	124.5
UCTA	B0205.	1	CREW STATION - RIGHT	.5	84.9	14.5	124.5
ASSY,BIOBELT	B0207.	1	CREW STATION - LEFT	.2	84.9	-14.5	124.5
ASSY,BIOBELT	B0207.	1	CREW STATION - RIGHT	.2	84.9	14.5	124.5
ITLSA (CDR)	B0211.	1	CREW STATION - LEFT	45.0	84.9	-14.5	124.5
ITLSA (LMP)	B0211.	1	CREW STATION - RIGHT	45.0	84.9	14.5	124.5
GLOVES,EV	B0213.	1	CREW STATION - LEFT	2.1	84.9	-14.5	124.5
GLOVES,EV	B0213.	1	CREW STATION - RIGHT	2.1	84.9	14.5	124.5
HELMET ASSY	B0214.	1	CREW STATION - LEFT	2.6	84.9	-14.5	124.5
HELMET ASSY	B0214.	1	CREW STATION - RIGHT	2.6	84.9	14.5	124.5
HARNESS,ELEC - SUIT	B0215.	1	CREW STATION - LEFT	.5	84.9	-14.5	124.5
HARNESS,ELEC - SUIT	B0215.	1	CREW STATION - RIGHT	.5	84.9	14.5	124.5
VISE DEVICE,DRILL STRING	03072.	1	ZONE A1	.5	120.1	.3	115.9
HARNESS,BIOINSTRUMENTION	B0216.	1	CREW STATION - LEFT	.3	84.9	-14.5	124.5
HARNESS,BIOINSTRUMENTION	B0216.	1	CREW STATION - RIGHT	.3	84.9	14.5	124.5
COMMUNICATION CARRIER	B0217.	1	CREW STATION - LEFT	1.6	84.9	-14.5	124.5
COMMUNICATION CARRIER	B0217.	1	CREW STATION - RIGHT	1.6	84.9	14.5	124.5
POCKET,CHECKLIST AND SCISSORS	B0218.	1	CREW STATION - LEFT	.2	84.9	-14.5	124.5
POCKET,CHECKLIST AND SCISSORS	B0218.	1	CREW STATION - RIGHT	.2	84.9	14.5	124.5
POCKET,CHECKLIST	B0219.	1	CREW STATION - LEFT	.2	84.9	-14.5	124.5
POCKET,CHECKLIST	B0219.	1	CREW STATION - RIGHT	.2	84.9	14.5	124.5
REMOTE CONTROL UNIT,PLSS	B1001.	1	CREW STATION - LEFT	5.1	84.9	-14.5	124.5
REMOTE CONTROL UNIT,PLSS	B1001.	1	CREW STATION - RIGHT	5.1	84.9	14.5	124.5

TABLE 3.1-3.1 (CONTINUED)

LRV MASS PROPERTIES - FIRST TRAVERSE

LRV AT DEPARTURE WITH TWO CREW RIDING

					LRV COORDINATES		
DESCRIPTION	STOW. ITEM REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
OXYGEN PURGE SYSTEM (OPS)	B1012.	1	CREW STATION - LEFT	35.9	84.9	-14.5	124.5
L.E.V.A.	B1014.	1	CREW STATION - LEFT	5.6	84.9	-14.5	124.5
L.E.V.A.	B1014.	1	CREW STATION - RIGHT	5.6	84.9	14.5	124.5
GLOVES - EVA	B1015.	1	CREW STATION - LEFT	2.7	84.9	-14.5	124.5
GLOVES - EVA	B1015.	1	CREW STATION - RIGHT	2.7	84.9	14.5	124.5
OVERSHOES (PAIR)	B1018.	1	CREW STATION - LEFT	4.5	84.9	-14.5	124.5
OVERSHOES (PAIR)	B1018.	1	CREW STATION - RIGHT	4.5	84.9	14.5	124.5
TETHER,WAIST EVA	B1020.6	1	CREW STATION - LEFT	.5	84.9	-14.5	124.5
TETHER,WAIST EVA	B1020.7	1	CREW STATION - RIGHT	.5	84.9	14.5	124.5
PLSS/EVCS ASSY	B1024.	1	CREW STATION - LEFT	101.8	84.9	-14.5	124.5
PLSS/EVCS ASSY	B1025.	1	CREW STATION - RIGHT	101.8	84.9	14.5	124.5
GARMENT,LIQUID COOLING	B1030.	1	CREW STATION - LEFT	4.3	84.9	-14.5	124.5
GARMENT,LIQUID COOLING	B1030.	1	CREW STATION - RIGHT	4.3	84.9	14.5	124.5
SAFETY LINE,L.S.(100 FT)	B1041.	1	LEFT OF ZONE A5	1.3	120.5	-19.0	116.5
BRUSH,LUNAR DUST	B1045.	1	ZONE A5	1.4	122.2	7.2	124.2
BAG,L.S.SAFETY LINE	B1047.	1	LEFT OF ZONE A5	.1	120.5	-19.0	116.5
BAG,DRINKING (IN SUIT)	B1048.	1	CREW STATION - LEFT	2.8	84.9	-14.5	124.5
BAG,DRINKING (IN SUIT)	B1048.	1	CREW STATION - RIGHT	2.8	84.9	14.5	124.5
BUDDY SLSS ASSY	B1052.	1	ZONE C1	10.9	99.2	14.5	119.8
OXYGEN PURGE SYSTEM (OPS)	B1059.	1	CREW STATION - RIGHT	35.9	84.9	14.5	124.5
HARNESS,GEOL.EQUIP.(CDR)	B1063.	1	CREW STATION - LEFT	1.5	84.9	-14.5	124.5
HARNESS,GEOL.EQUIP.(LMP)	B1064.	1	CREW STATION - RIGHT	1.5	84.9	14.5	124.5
BIOINSTRUMENTATION ASSY	C0201.	1	CREW STATION - LEFT	1.1	84.9	-14.5	124.5
BIOINSTRUMENTATION ASSY	C0201.	1	CREW STATION - RIGHT	1.1	84.9	14.5	124.5
DOSIMETER,PERSONAL	D0200.	1	CREW STATION - LEFT	.4	84.9	-14.5	124.5
DOSIMETER,PERSONAL	D0200.	1	CREW STATION - RIGHT	.4	84.9	14.5	124.5
LM PILOT	TBD	1	CREW STATION - RIGHT	162.0	84.9	14.5	124.5
COMMANDER	TBD	1	CREW STATION - LEFT	183.0	84.9	-14.5	124.5
LRV FIRST TRAVERSE DEPARTURE - TWO CREW				1479.80	72.36	-.13	110.71
LESS ONE CREW AND EQUIPMENT - ZONE C				-394.10	85.29	14.50	124.30
PLUS FOLLOWING ITEMS:							
CABLE,LCRU/CTV	E1001.4	1	BELOW RT.CREW STA.	1.4	84.5	14.5	104.0
BUDDY SLSS ASSY	B1052.	1	ZONE C1	10.9	99.2	14.5	119.8
REFLECTOR,LASER RANGING	G4034	1	CREW STATION - RIGHT	80.2	84.9	14.5	124.5
DRILL ASSY,APOLLO L.S.	G4047	1	CREW STATION - RIGHT	26.5	84.9	14.5	124.5
LRV FIRST TRAVERSE DEPARTURE - ONE CREW				1199.70	69.49	-3.48	114.93

TABLE 3.1-3.1 (CONTINUED)

LRV MASS PROPERTIES - FIRST TRAVERSE

LRV CREW SYSTEM

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	LRV COORDINATES X-C.G.	Y-C.G.	Z-C.G.
LUNAR SURFACE MAPS,LM	A0114.13		1	ZONE A10	1.5	84.9	.0	124.5
CHRONOGRAPH	A0202.		1	CREW STATION - LEFT	.1	84.9	-14.5	124.5
CHRONOGRAPH	A0202.		1	CREW STATION - RIGHT	.1	84.9	14.5	124.5
SUBSYSTEM,FECAL CONTAINMENT	B0113.		1	CREW STATION - LEFT	.3	84.9	-14.5	124.5
SUBSYSTEM,FECAL CONTAINMENT	B0113.		1	CREW STATION - RIGHT	.3	84.9	14.5	124.5
UCTA	B0205.		1	CREW STATION - LEFT	.5	84.9	-14.5	124.5
UCTA	B0205.		1	CREW STATION - RIGHT	.5	84.9	14.5	124.5
ASSY,BIOBELT	B0207.		1	CREW STATION - LEFT	.2	84.9	-14.5	124.5
ASSY,BIOBELT	B0207.		1	CREW STATION - RIGHT	.2	84.9	14.5	124.5
ITLSA (CDR)	B0211.		1	CREW STATION - LEFT	45.0	84.9	-14.5	124.5
ITLSA (LMP)	B0211.		1	CREW STATION - RIGHT	45.0	84.9	14.5	124.5
GLOVES,EV	B0213.		1	CREW STATION - LEFT	2.1	84.9	-14.5	124.5
GLOVES,EV	B0213.		1	CREW STATION - RIGHT	2.1	84.9	14.5	124.5
HELMET ASSY	B0214.		1	CREW STATION - LEFT	2.6	84.9	-14.5	124.5
HELMET ASSY	B0214.		1	CREW STATION - RIGHT	2.6	84.9	14.5	124.5
HARNESS,ELEC - SUIT	B0215.		1	CREW STATION - LEFT	.5	84.9	-14.5	124.5
HARNESS,ELEC - SUIT	B0215.		1	CREW STATION - RIGHT	.5	84.9	14.5	124.5
HARNESS,BIOINSTRUMENTION	B0216.		1	CREW STATION - LEFT	.3	84.9	-14.5	124.5
HARNESS,BIOINSTRUMENTION	B0216.		1	CREW STATION - RIGHT	.3	84.9	14.5	124.5
COMMUNICATION CARRIER	B0217.		1	CREW STATION - LEFT	1.6	84.9	-14.5	124.5
COMMUNICATION CARRIER	B0217.		1	CREW STATION - RIGHT	1.6	84.9	14.5	124.5
POCKET,CHECKLIST AND SCISSORS	B0218.		1	CREW STATION - LEFT	.2	84.9	-14.5	124.5
POCKET,CHECKLIST AND SCISSORS	B0218.		1	CREW STATION - RIGHT	.2	84.9	14.5	124.5
POCKET,CHECKLIST	B0219.		1	CREW STATION - LEFT	.2	84.9	-14.5	124.5
POCKET,CHECKLIST	B0219.		1	CREW STATION - RIGHT	.2	84.9	14.5	124.5
REMOTE CONTROL UNIT,PLSS	B1001.		1	CREW STATION - LEFT	5.1	84.9	-14.5	124.5
REMOTE CONTROL UNIT,PLSS	B1001.		1	CREW STATION - RIGHT	5.1	84.9	14.5	124.5
OXYGEN PURGE SYSTEM (OPS)	B1012.		1	CREW STATION - LEFT	35.9	84.9	-14.5	124.5
L.E.V.A.	B1014.		1	CREW STATION - LEFT	5.6	84.9	-14.5	124.5
L.E.V.A.	B1014.		1	CREW STATION - RIGHT	5.6	84.9	14.5	124.5
GLOVES - EVA	B1015.		1	CREW STATION - LEFT	2.7	84.9	-14.5	124.5
GLOVES - EVA	B1015.		1	CREW STATION - RIGHT	2.7	84.9	14.5	124.5

TABLE 3.1-3.1 (CONTINUED)

LRV MASS PROPERTIES - FIRST TRAVERSE

LRV CREW SYSTEM

					LRV COORDINATES		
DESCRIPTION	STOW. ITEM REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
OVERSHOES (PAIR)	B1018.	1	CREW STATION - LEFT	4.5	84.9	-14.5	124.5
OVERSHOES (PAIR)	B1018.	1	CREW STATION - RIGHT	4.5	84.9	14.5	124.5
TETHER,WAIST EVA	B1020.6	1	CREW STATION - LEFT	.5	84.9	-14.5	124.5
TETHER,WAIST EVA	B1020.7	1	CREW STATION - RIGHT	.5	84.9	14.5	124.5
PLSS/EVCS ASSY	B1024.	1	CREW STATION - LEFT	101.8	84.9	-14.5	124.5
PLSS/EVCS ASSY	B1025.	1	CREW STATION - RIGHT	101.8	84.9	14.5	124.5
GARMENT,LIQUID COOLING	B1030.	1	CREW STATION - LEFT	4.3	84.9	-14.5	124.5
GARMENT,LIQUID COOLING	B1030.	1	CREW STATION - RIGHT	4.3	84.9	14.5	124.5
SAFETY LINE,L.S.(100 FT)	B1041.	1	LEFT OF ZONE A5	1.3	120.5	-19.0	116.5
BRUSH,LUNAR DUST	B1045.	1	ZONE A5	1.4	122.2	7.2	124.2
BAG,L.S.SAFETY LINE	B1047.	1	LEFT OF ZONE A5	.1	120.5	-19.0	116.5
BAG,DRINKING (IN SUIT)	B1048.	1	CREW STATION - LEFT	2.8	84.9	-14.5	124.5
BAG,DRINKING (IN SUIT)	B1048.	1	CREW STATION - RIGHT	2.8	84.9	14.5	124.5
BUDDY SLSS ASSY	B1052.	1	ZONE C1	10.9	99.2	14.5	119.8
OXYGEN PURGE SYSTEM (OPS)	B1059.	1	CREW STATION - RIGHT	35.9	84.9	14.5	124.5
HARNESS,GEOL.EQUIP.(CDR)	B1063.	1	CREW STATION - LEFT	1.5	84.9	-14.5	124.5
HARNESS,GEOL.EQUIP.(LMP)	B1064.	1	CREW STATION - RIGHT	1.5	84.9	14.5	124.5
BIOINSTRUMENTATION ASSY	C0201.	1	CREW STATION - LEFT	1.1	84.9	-14.5	124.5
BIOINSTRUMENTATION ASSY	C0201.	1	CREW STATION - RIGHT	1.1	84.9	14.5	124.5
DOSIMETER,PERSONAL	D0200.	1	CREW STATION - LEFT	.4	84.9	-14.5	124.5
DOSIMETER,PERSONAL	D0200.	1	CREW STATION - RIGHT	.4	84.9	14.5	124.5
LM PILOT	TBD	1	CREW STATION - RIGHT	162.0	84.9	14.5	124.5
COMMANDER	TBD	1	CREW STATION - LEFT	183.0	84.9	-14.5	124.5
-CREW SYS TOTAL				799.80	85.22	-.20	124.92

Current Weight and c.g. by Loading Zone (for Limit Weight per Zone Reference LRV Operations Handbook, Appendix A)

	Weight	$\bar{X}$	$\bar{Y}$	$\bar{Z}$
Zone A (Aft of Seat)	98.0	115.2	0.6	117.8
Zone B (Left Crew & Equipment)	402.8 18.1	84.9	-14.5	123.6
Zone C (Right Crew & Equipment)	381.8 12.3	85.3	14.5	124.3
Zone D (Console Area Right Side)	11.4	62.0	8.0	138.3
Zone E (Console Area Left Side)	3.0	71.7	-6.6	135.8
Zone F (Forward Vehicle Area)	88.0	10.0	2.0	116.7
Zone C (Without LMP)	119.0	86.2	14.5	123.8

TABLE 3.1-4

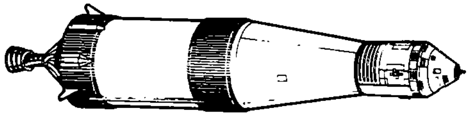
HIGH ALTITUDE ABORT MASS PROPERTIES

To be Supplied at a Later Date

TABLE 3.1-5

PAD ABORT MASS PROPERTIES

To be Supplied at a Later Date



LV COORDINATES

TABLE 3.1-6
SIVB EXPECTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2		
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ
SIVB POST E.O.I.		200873.9	2833.0	1.0	-.8	1464651	940980	937974			
CSM		66986.7	3690.5	4.9	4.8	36354	79959	81614			
LM IN SLA		36206.8	3340.2	.4	-.9	25510	27057	25853			
SIVB+CSM+LM POST E.O.I.		304067.4	3082.3	1.8	.4	1527051	9610335	9607607			
SIVB PRE T.L.I.		198435.9	2830.6	1.0	-.8	1458047	918334	915614			
CSM PRE T.L.I.		66963.6	3690.5	4.9	4.8	36344	79952	81609			
LM IN SLA		36206.8	3340.2	.4	-.9	25510	27057	25853			
SIVB+CSM+LM PRE T.L.I.		301606.3	3082.7	1.8	.4	1520437	9605921	9603486			
SIVB POST T.L.I.		36942.9	2960.0	5.0	-4.0	88543	562135	559096			
CSM POST T.L.I.		66963.6	3690.5	4.9	4.8	36344	79952	81609			
LM IN SLA		36206.8	3340.2	.4	-.9	25510	27057	25853			
SIVB+CSM+LM POST T.L.I.		140113.3	3407.4	3.8	1.0	150955	3459273	3456366			
SIVB (EXCL. SLA PANELS)		34122.9	2921.8	5.6	-4.3	81987	405668	403364			
LM IN SLA		36206.8	3340.2	.4	-.9	25510	27057	25853			
SIVB+LM PRE DOCKING		70329.7	3137.2	2.9	-2.5	107642	1096566	1092918			

NOTE: Products of inertia are not presently available for the S-IVB. This table will be updated to include products of inertia when data is available.

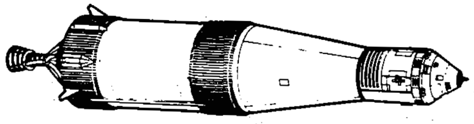

XA COORDINATES

TABLE 3.1-6 (CONTINUED)
SIVB EXPCTED SEQUENTIAL MASS PROPERTIES

DESCRIPTION	S	WEIGHT POUNDS	C. G. INCHES			INERTIAS SLUG-FT2			PRODUCTS SLUG-FT2		
			X	Y	Z	IXX	IYY	IZZ	PXY	PXZ	PYZ
SIVB (EXCL. SLA PANELS)		34122.9	1657.0	-.9	7.0	81987	403928	405302			
CSM AT TRANS/DOCK		66893.0	933.9	4.9	4.8	36268	79902	81569			
LM AT TRANS/DOCK		36204.1	1238.1	-.6	.8	25505	25891	26807			
CSM/LM/SIVB DOCKED		137220.0	1194.0	2.0	4.3	144150	3080383	3084424			
CSM/LM DOCKED		103097.1	1040.7	3.0	3.4	62008	575057	577712			

NOTE: Products of inertia are not presently available for the S-IVB. This table will be updated to include products of inertia when data is available.

TABLE 3.1-7

CSM 112 CONSUMABLES WEIGHT CHANGE SUMMARY

(To be used in conjunction with CSM sequential mass properties Tables 3.1-2).

EVENT From	To	Consumable	Weight Change (Pounds)	Amount Remaining (Pounds)	Total Usage (Pounds)
Earth Orbit	Pre Trans/Dock	SM-Hydrogen			
		Tank 1 & 2	-0.8	54.4	-0.8
		Tank 3	-0.8	26.8	-0.8
		SM-Oxygen			
		Tank 1 & 2	-18.2	615.0	-18.2
		Tank 3	-4.1	312.5	-4.1
		CM-Waste H_2O	+0.8	18.8	
Pre Trans/Dock	Post Trans/Dock	SM-RCS	-70.6	1,271.8	-70.6
Post Trans/Dock	Pre L.O.I.	SM-Hydrogen			
		Tank 1 & 2	-3.8	50.6	-4.6
		Tank 3	-9.9	16.9	-10.7
		SM-Oxygen			
		Tank 1 & 2	-57.8	557.2	-76.0
		Tank 3	-83.2	229.3	-87.3
		SM-RCS	-111.3	1,160.5	-181.9
		CM-Waste H_2O	+21.2	40.0	
		CM-LiOH	+24.0	24.0	
		CM-Food	-6.2		-6.2
		Fecal	+2.0	2.0	
Pre L.O.I.	Post L.O.I.	SM-SPS	-26,370.0	14,223.7	-26,370.0
Post L.O.I.	Pre D.O.I.	SM-Hydrogen			
		Tank 1 & 2	-0.8	49.8	-5.4
		Tank 3	-0.3	16.6	-11.0
		SM-Oxygen			
		Tank 1 & 2	-3.0	554.2	-79.0
		Tank 3	-7.7	221.6	-95.0
		SM-RCS	-41.1	1,119.4	-223.0

TABLE 3.1-7 (CONTINUED)

CSM 112 CONSUMABLES WEIGHT CHANGE SUMMARY

(To be used in conjunction with CMS sequential mass properties Table 3.1-2).

EVENT			Weight Change (Pounds)	Amount Remaining (Pounds)	Total Usage (Pounds)
From	To	Consumable			
Pre D.O.I.	Post D.O.I.	SM-SPS	-1,565.2	12,658.5	-27,935.2
Post D.O.I.	CSM/LM Sep.	SM-Hydrogen			
		Tank 1 & 2	-3.0	46.8	-8.4
		Tank 3	-0.7	15.9	-11.7
		SM-Oxygen			
		Tank 1 & 2	-10.2	544.0	-89.2
		Tank 3	-24.1	197.5	-119.1
		SM-RCS	-113.3	1,006.1	-336.3
		CM-LiOH	+6.0	30.0	
		CM-Food	-3.8		-10.0
		Fecal	+3.0	5.0	
CSM/LM Sep.	Pre Circularization	SM-Hydrogen			
		Tank 1 & 2	-0.2	46.6	-8.6
		Tank 3	-0.1	15.8	-11.8
		SM-Oxygen			
		Tank 1 & 2	-1.2	542.8	-90.4
		Tank 3	-1.2	196.3	-120.3
		SM-RCS	-22.5	983.6	-358.8
Pre Circularization	Post Circularization	SM-SPS	-278.8	12,379.7	-28,214.0
Post Circularization	Pre Plane Change	SM-Hydrogen			
		Tank 1 & 2	-11.2	35.4	-19.8
		Tank 3	-1.7	14.1	-13.5
		SM-Oxygen			
		Tank 1 & 2	-79.4	463.4	-169.8
		Tank 3	-43.0	153.3	-163.3
		SM-RCS	-110.4	873.2	-469.2
		Fecal	+3.0	8.0	

TABLE 3.1-7 (CONTINUED)

CSM 112 CONSUMABLES WEIGHT CHANGE SUMMARY

(To be used in conjunction with CSM sequential mass properties Table 3.1-2).

EVENT From	To	Consumable	Weight Change (Pounds)	Amount Remaining (Pounds)	Total Usage (Pounds)
Pre Plane Change	Post Plane Change	SM-SPS	-1,133.2	11,246.5	-29,347.2
Post Plane Change	CSM/ASCT Dock	SM-Hydrogen			
		Tank 1 & 2	-1.4	34.0	-21.2
		Tank 3	-0.4	13.7	-13.9
		SM-Oxygen			
		Tank 1 & 2	-11.0	452.4	-180.8
		Tank 3	-5.3	148.0	-168.6
		SM-RCS	-86.7	786.5	-555.9
		CM-Food	-4.3		-14.3
		CM-LiOH	+12.0	42.0	
		CM-Fecal	+3.1	11.1	
CSM/ASCT Docking	Pre T.E.I.	SM-Hydrogen			
		Tank 1 & 2	-8.6	25.4	-29.8
		Tank 3	-2.2	11.5	-16.1
		SM-Oxygen			
		Tank 1 & 2	-68.6	383.8	-249.4
		Tank 3	-32.6	115.4	-201.2
		SM-RCS	-90.7	695.8	-646.6
		CM-LiOH	+5.0	47.0	
		CM-Fecal	+3.0	14.1	
		CM-Food	-3.8		-18.1
Pre T.E.I.	Post T.E.I.	SM-SPS	-9,442.5	1,804.0	-38,789.7
Post T.E.I.	SM Jettison	SM-Hydrogen			
		Tank 1 & 2	-9.8	15.6	-39.6
		Tank 3	-3.1	8.4	-19.2
		SM-Oxygen			
		Tank 1 & 2	-99.6	284.2	-349.0
		Tank 3	-51.1	64.3	-252.3

TABLE 3.1-7 (CONTINUED)

CSM 112 CONSUMABLES WEIGHT CHANGE SUMMARY

(To be used in conjunction with CSM sequential mass properties Table 3.1-2).

EVENT From	To	Consumable	Weight Change (Pounds)	Amount Remaining (Pounds)	Total Usage (Pounds)
Post T.E.I. (Continued)	SM Jettison	SM-RCS	-112.6	583.2	-759.2
		CM-LiOH	+17.0	64.0	
		CM-Food	-7.3		-25.4
		CM-Fecal	+4.6	18.7	
SM Jettison	CM @ Entry	CM-RCS	-11.6	233.4	-11.6
CM @ Entry	CM @ M.C. Deploy	CM-RCS	-30.7	202.7	-42.3
CM @ M.C. Deploy	CM @ Impact	CM-RCS	-202.7	0.0	-245.0

TABLE 3.1-8

LM-10 CONSUMABLES CHANGE SUMMARY

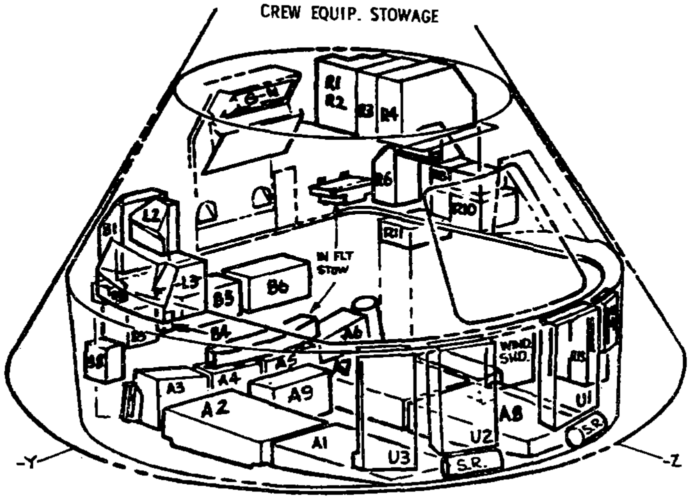
(To be used in conjunction with the LM sequential mass properties Table 3.1-3)

EVENT From	To	Consumable	Weight Change (Pounds)	Amount Remaining (Pounds)	Total Usage (Pounds)
Earth Orbit	CSM/LM Separation	D/S-Oxygen	-1.0	95.0	-1.0
		D/S-Water	-15.0	375.0	-15.0
		LM-RCS	-5.0	599.9	-5.0
CSM/LM Separation	Pre P.D.I.	D/S-Oxygen	-0.6	94.4	-1.6
		D/S-Water	-20.0	355.0	-25.0
		LM-RCS	-61.5	538.4	-66.5
Pre P.D.I.	LM @ Touchdown	D/S-Oxygen	-0.1	94.3	-1.7
		D/S-Water	-2.0	353.0	-27.0
		LM-RCS	-98.0	440.4	-164.5
		LM-DPS	-18,741.4	764.9	-18,741.4
LM @ Touchdown	A/S @ Lift-Off	LM-RCS	-5.0	435.4	-169.5
LM @ Lift-Off	A/S in Orbit	LM-APS	-4,894.2	334.5	-4,894.2
A/S in Orbit	A/S Pre T.P.I.	A/S-Water	-4.2	90.8	-4.2
		A/S-Oxygen	-0.2	4.6	-0.2
		LM-RCS	-47.4	388.0	-216.9
A/S Pre T.P.I.	A/S Post T.P.I.	LM-APS	-32.1	302.4	-4,926.3
A/S Post T.P.I.	A/S @ Docking	A/S-Water	-9.2	81.6	-13.4
		A/S-Oxygen	-0.3	4.3	-0.5
		LM-RCS	-70.2	317.8	-287.1
A/S @ Docking	A/S Jettison	A/S-Water	-11.0	70.6	-24.4

TABLE 3.1-9

MISSION J-1 COMMAND MODULE STOWAGE VOLUME CENTROID

APOLLO 15
CREW EQUIP. STOWAGE



S/C 112 "J-SERIES" LAUNCH STOWAGE LIST

A-1

TV CAMERA, COLOR
ZOOM LENS WITH COVER
TV MONITOR
TV MONITOR CABLE
TV POWER CABLE
TV CAMERA RINGSIGHT
TV MOUNTING BRACKET
16MM CAMERA SEXTANT ADAPTER
70MM CAMERA ADAPTER
70MM REMOTE CONTROL CABLE
16MM FILM MAGS AND 2 BAGS -7
70MM FILM MAGAZINES AND BAG - 2
2 SPEED INTERVAL TIMER
VOICE RECORDER W/CASS. & BATT.
UV FILTER ASSY (105MM LENS)
UV CAMERA MOUNT
UV 70MM MAGAZINE
INFLIGHT RETAINER STRAPS - 3
35 MM CAMERA BRACKET

A-2

PPK'S - 3
TISSUE DISPENSERS - 8
FECAL CONTAINMENT SUBSYSTEM - 3
HEAD REST PADS - 3
HEEL CLIPS - 3 PR.
HEEL RESTRAINT CONTAINER
JETTISON STOWAGE BAGS -3 (2 OFF*)

EVA GLOVES (CMP)
EVA EQUIPMENT CONTAINER
PGA ADAPTER
WRIST TETHER
IV CREWMAN TETHER
OPS PGA STRAPS -4
OPS CONTROL VALVE STRAPS -2
ENTRY TIEDOWN ROPES AND BAG - 5
ENTRY BOOTS CONTAINER
GAUGE ASSY. (PANEL 603)
70MM HASSEL.HANDLE/TRIGGER
VACUUM CLEANER DECOM. BAG.
VACUUM CLEAN BAGS -2
VACUUM CLEAN POWER CABLE

TOP OF A-2

DECONTAMINATION BAGS*
ISA DECONTAMINATION BAG*
CONTINGENCY LUNAR SAMPLE RETURN
LS HASSELBLAD MAGS -4
SRC NO. 1 AND NO. 2
LUNAR SAMPLE (B/SLSS AREA)
16MM DAC
PENETROMETER

A-3

CO_2 ABSORBERS - 4
FIRE EXTINGUISHER (ON A-3)

A-4

CO_2 ABSORBERS - 4

A-5

CO_2 ABSORBERS - 4

A-6

CO_2 ABSORBERS - 4

SIDE A-6

VACUUM CLEANER

A-7

FOOD, PACKAGED
FECAL COLLECTION ASSY. - 30 (12*)
FECAL COLLECTION ASSY. BAGS - 2 (1*,

SIDE OF A-7

INFLT. RETAINER STRAP
EVA UMBILICAL & BAG

* = LM TRANSFER ITEMS

A-8

IN-FLIGHT EXERCISER
CWG - 9
EMU MAINTENANCE KIT
LIGHT WEIGHT HEADSETS - 3
CWG ELECTRICAL ADAPTERS - 4
CWG ELECTRICAL ADAPTERS BAG
RELIEF RECEPTACLE ASSY.
RELIEF RECEPTABLE RESTRAIN. STRAP
RELIEF RECEP. CONTAINER
QD GAS FILTER ASSY. - 3
TOOL SET ASSEMBLY
PLV DUCTS - 3
PLV CONTAINER
70MM FILM MAGAZINES AND BAG - 3
CM TOWELS (RED,WHITE,BLUE) -9
H_2 GAS SEPARATOR
H_2 GAS SEPARATOR BAG
PGA O_2 UMBILICAL INTERCONN. - 3 -(1*)
O_2 INTERCONNECT CONTAINER
SNAG LINE
SNAG LINE CONTAINER
INFLIGHT RETAINER STRAP
WATER PANEL COUPLING ASSY.
WMS WATER PANEL QD
WMS POWER CABLE
WMS QD PRESSURE CAP
WMS B/U CONTAINER
QD ECS CONTAINER
TAPE CASSETTE KIT
ACOUSTIC TONE BOOSTER
ACOUSTIC TONE BOOSTER BAG
16MM FILM MAGS AND BAG -2
16MM FILM MAG. & BAG
URINE FILTER ASSY AND BAG -3
TAPE RECORDER BATTERIES -20
TAPE RECORDER BATTERIES BAG (PPK)

SIDE OF A-8

BAG - HOSE, URINE, VACUUM ETC.*
VACUUM BRUSH
URINE HOSE ASSY.
EVA GUARDS (LEFT, CENTER, RIGHT)
UTILITY STRAP
UNIPOD POLE

A-9

CO_2 ABSORBERS - 4
CARRIER ASSY. CONTAINER

B-1

FOOD AND HYGIENE ITEMS

B-2

35MM CAMERA AND MAG
35MM FILM CASS. -3
35MM CAMERA GADGET BAG

B-3

70MM HASSELBLAD CAMERA AND MAG.
16MM CAMERA AND MAG.
75MM LENS
18MM LENS
10MM LENS WITH COVER
POWER CABLE, DAC
RIGHT ANGLE MIRROR
INFLIGHT RETAINER STRAP
1° AUTO SPOTMETER

B-5

CO_2 ABSORBERS - 4
CLOSEOUT CURTAIN
DATA RETENTION SNAPS (SHORT) - 6
DATA RETENTION SNAPS (LONG) - 6
TEMP. STOWAGE POUCHES -2

B-6

CO_2 ABSORBERS - 4
CLOSEOUT CURTAIN
DATA RETENTION HOOKS (SHORT) - 2
DATA RETENTION HOOKS (LONG) - 2
SNAP CLAMPS - 8
SPRING CLIPS - 8

B-8

CHLOR. BUFFER AMPULES - 16
CHLOR. AMPULES - 16
CHLOR. AMPULES CONTAINERS - 2

L-2

CCU CONTROL HEAD CONTAINER
CCU CONTROL HEAD
GROUNDING CABLE
CCU CABLE (SPARE)
CCU CABLE STRAP
TOOL E HANDLE ADAPTER
INFLIGHT RETAINER STRAPS - 2
70MM INTERVALOMETER CABLE (PCM)
16MM DAC TIMING CABLE (PCM)
DOCKING PROBE CABLE

L-3

FOOD, PACKAGED
CONTINGENCY FEEDING VALVE

R-1

CONTINGENCY CHECKLIST
ENTRY CHECKLIST
SYSTEMS CHECKLIST
SYSTEMS UPDATE
G&C CHECKLIST

R-2

LAUNCH CHECKLIST
CSM UPDATES
CSM/LM ORBIT MONITOR CHARTS

R-3

RESCUE BOOK
EARTH ORBITAL MAP
DATA CARD KIT
EYEPATCH
METER COVERS - 2
VERB-NOUNS, G AND N PANEL
FUSE (16MM CAMERA)
FLIGHT DATA FILE CLIPS - 6
LM XFR DATA CARD KIT
LM DATA CARD BOOK
LM LUNAR SURFACE CHECKLIST
LM ACTIVATION CHECKLIST
LM TIMELINE BOOK
LM ORBIT CHARTS (A,B,C,D)

R-12

CSM LUNAR LANDMARK MAP
CSM SYSTEM DATA
CSM MALFUNCTION PROCEDURES
FLIGHT PLAN
CMP SOLO BOOK

R-4

RUCKSACK SURVIVAL KIT NO. 1
RUCKSACK SURVIVAL KIT NO. 2

R-5

PROBE STOWAGE STRAPS - 2
INFLIGHT RETAINER STRAPS -7-(3*)
UTILITY STRAPS - 6 -(3*)
URINE FILTER BAG
COUCH RESTRAINING STRAPS -2

R-6

TAPE
OUA HIGH DENSITY SUNFILTERS - 2
CHLOR. SYRINGE KNOB
CHLOR. SYRINGE CASING
CHLOR. NEEDLE
CHLOR. SYRINGE CONTAINER
PENLIGHTS AND CONTAINER - 5

R-8

MEDICAL KIT

R-11

URINE TRANSFER SYSTEMS - 3
URINE RECEIVER ASSY. (SPARE)
ROLL ON CUFFS (RED, WHITE, BLUE)
URINE FILTER, HI CAP. & BAG

R-13

16MM MAGAZINES AND TRANS. BAG - 6*
16 MM MAG. AND TRANS. BAG -2*
70 MM MAGAZINES AND TRANS. BAG - 4*
70 MM MAG. AND TRANS. BAG -3*
RADIATION DOSIMETER
70 MM MAG. AND TRANS. BAG -3*
70 MM MAG. AND TRANS. BAG -3*

AFT. BLKHD.

EVA UMBILICAL ASSY.
EVA TETHER CONTAINER

U-1

LIQUID COOLED GARMENTS - 2
TEMPORARY STOWAGE CONTAINERS - 3
H "Z" RADIATION DOSIMETER

U-2

INFLIGHT HELMET STOWAGE BAGS - 3
ACCESSORY BAGS - 3
ICG JACKETS - 3
ICG TROUSERS - 3
ICG BOOTS (RIGHT) - 3
ICG BOOTS (LEFT) - 3
EARTUBES - 3
CABIN FAN FILTER AND BAG

U-3

COAS FILTER
COAS LIGHT BULBS - 2
16MM CAMERA BRACKET
LM DOCKING TARGET
DOCKING TARGET ADAPTER

U-4

TAPE RECORDER CASSETTES - 4
TAPE RECORDER BATTERIES - 4
10 X 40 MONOCULAR
INTERVALOMETER (70MM HASSELBLAD
250MM LENS

PGA BAG

HELMET PROTECTIVE SHIELD
ELECTRICAL CONNECTOR COVERS - 3
UCTA CLAMPS - 3
WATER BAGS, CONTING. ~~RETURN-5~~
H_2O/URINE BAGS, CONTINGENCY-2
FECAL MANAGEMENT BAG

PGA

O_2 HOSE SCREEN CAPS - 3
EAR PLUGS - 2 PR

ECU

CO_2 ABSORBERS - 2

LHFEB

CCU CABLE (LEFT, CENTER, RIGHT)
WATER GUN

LHLEB

O_2 UMBILICAL (L, CENTER, R)
O_2 HOSE CLAMPS - 3
ASSY. L CALFAX ADAPTER

UEB

RENDEZVOUS SHADE (LEFT, RIGHT)
SIDE SHADE (LEFT, RIGHT)
HATCH SHADE
WINDOW SHADE CONTAINER
RH RENDEZVOUS SHADE (S-178 EXP.)
UV WINDOW SHADE

AFT. UEB

SLEEP RESTRAINTS (L, CENTER, R)
O_2 MASK AND HOSE - 3
O_2 MASK AND HOSE CONTAINER
INFLIGHT RETAINER STRAPS - 3

TABLE 3.1-9 (CONTINUED)

MISSION J-1 COMMAND MODULE STOWAGE VOLUME CENTROID

LAUNCH STOWAGE	ITEM	RETURN STOWAGE
LM	PPK'S - 3	A-8
LM	CONTINGENCY LUNAR SAMPLE	ON TOP A-2 IN ISA
LM	OXYGEN PURGE SYSTEM	A-7
LM	EMU MAINTENANCE KIT	In CDR Helmet Stowage Bag in PGA Bag
LM	PURGE VALVE ASSY.	A-7
LM	STANDARD FLAG KIT	A-8
LM	CONTINGENCY IV SAFETY TETHER	A-7
LM	SR C NO. 1	B-5
LM	2	B-6
LM	SOLAR WIND COMPOSITION	ON TOP A-2 IN ISA
LM	IV CREWMAN TETHERS - 2	A-7
LM	ISA	Inside ISA Decon. Bag on Top of A-2
LM	SAMPLE RETURN BAG (B/SLSS AREA - 36 lb)	Inside Sample Return Decon. Bag on Top of A-7
LM	PRENETROMETER DRUM	A-7
TOP A-2	PENETROMETER DECONTAM. BAG	A-7
A-2	603 GAUGE ASSY	A-7
A-2	SAMPLE RETURN DECON. BAG (B/SLSS AREA)	ON TOP OF A-7
A-2	70 MM HASSEL. HANDLE/TRIGGER	A-7
A-2	VACUUM CLEANER BAGS-2	A-7
A-2	VACUUM CLEANER POWER CABLE	A-7
A-2	VACUUM CLEANER DECOM. BAG	A-7
A-2	HEAD REST PADS - 3	On Couch
A-2	HEEL CLIPS - 3 PR.	On Crew
A-2	OPS CONTROL UNIT ADAPTER	A-7
A-2	OPS ATTACH. STRAPS - 4	A-7
A-2	EVA EQUIPMENT CONTAINER	A-7
A-7	FECAL COLLECTION ASSY. - 30	12 - Offloaded Unused A-7
A-8	CWG ELECTRICAL ADAPTERS - 4	3 - On Crew 1 - A-8
SM SIM BAY	24" PAN CAMERA MAGAZINE	A-2
SM SIM BAY	3" MAPPING CAMERA MAGAZINE	B-1

LAUNCH STOWAGE	ITEM	RETURN STOWAGE
A-9	CONTAINERS	Offloaded TO LM
B-5	CONTAINERS	Offloaded TO LM
B-6	CONTAINERS	Offloaded TO LM
A-9	CO_2 ABSORBERS - 4	A-9 Offloaded Inside Container
B-5	CO_2 ABSORBERS - 4	B-5 Offloaded Inside Container
B-6	CO_2 ABSORBERS - 4	B-6 Offloaded Inside Container
TOP A-2	SRC DECON. BAGS -3	1 - A-9 1 - B-5 1 - B-6
U-2	ICG JACKETS - 3	On Crew
U-2	ICG TROUSERS - 3	On Crew
U-2	ICG BOOTS (RIGHT) - 3	On Crew
U-2	ICG BOOTS (LEFT) - 3	On Crew
	PGA EQUIPMENT	
ON CREW	PRESSURE HELMETS - 3	2 - In PGA Bag 1 - On PGA, Sleep Restraint on Top A-7 and A-8
ON CREW	PRESSURE GARMENT ASSEMBLY (PGA) - 3	2 - In PGA Bag 1 - In Sleep Restraint on Top A-7 and A-8
LM	LEVA'S - 2	1 - On Helmet, on PGA on Top A-7 and A-8 1 - On Helmet in PGA Bag
A-2	EV GLOVES (CMP)	In Helmet in Accessory Bag On Top of A-7 & A-8
LM	EV GLOVES - 2 PR.	In Helmet in Accessory Bags in PGA Bag
ON CREW	IV GLOVES - 3 PR.	2 - In PGA's in PGA Bag 1 - In PGA in Sleep Restraint on Top of A-7 and A-8
U-2	ACCESSORY BAGS - 3	2 - In Helmets in PGA Bag 1 - In Helmet in LEVA on Top of A-7 and A-8
LM	HELMET STOWAGE BAGS - 2	1 - On Helmet in PGA Bag 1 - Loose in PGA Bag
PGA BAG	HELMET PROTECTIVE SHIELD	On Helmet (Without LEVA) in Helmet Stowage Bag in PGA Bag

TABLE 3.1-9 (CONTINUED)

MISSION J-1 COMMAND MODULE STOWAGE VOLUME CENTROIDS

SPACECRAFT 112

AREA	X	Y	Z
A1	1011.0	-21.0	-22.0
2	1011.0	-22.0	8.0
3	1016.0	-24.0	28.0
4	1015.0	-7.0	28.0
5	1015.0	9.0	28.0
6	1017.0	26.0	28.0
7	1011.0	22.0	8.0
8	1011.0	21.0	-23.0
9	1013.0	0.0	16.0
B1	1050.0	-27.0	39.0
2	1039.0	-38.0	37.0
3	1031.0	-28.0	40.0
4	1031.0	-20.0	40.0
5	1031.0	-8.0	39.0
6	1031.0	13.0	39.0
8	1024.0	-38.0	37.0
L2	1059.0	-44.0	14.0
3	1048.0	-47.0	12.0
R1	1072.0	26.0	21.0
2	1072.0	26.0	14.0
3	1072.0	26.0	9.0
4	1075.0	28.0	3.0
5	1059.0	44.0	15.0
6	1048.0	46.0	29.0
8	1052.0	46.0	12.0
11	1038.0	47.0	26.0
13	1024.0	45.0	-26.0
U1	1033.0	23.0	-50.0
2	1033.0	-23.0	-50.0
3	1033.0	-36.0	-44.0
4	1038.0	39.0	-43.0

TABLE 3.1-9 (CONCLUDED)

MISSION J-1 COMMAND MODULE STOWAGE VOLUME CENTROID

The following stowage locations have unique volume centroids not associated with stowage volumes.

NOMENCLATURE	LOCATION	X	Y	Z
G&N Signal Cond. Panel	LEB	1069.0	25.0	29.0
Display Keyboard	LEB	1060.0	26.0	32.0
Sleep Restraint Assy - Rt. & Center	Aft UEB	1018.0	23.0	-50.0
Sleep Restraint Assy - Left	Aft UEB	1018.0	-23.0	-50.0
Entry Locations				
Sleep Restraint - RH & Center	Top of Area A8	1020.0	25.0	-8.0
ITLSA - IV (CMP)	On RH & Ctr Sleep Restraint	1020.0	25.0	-22.0
Food Container	L3	1048.0	-47.0	12.0
Food Container	B1	1050.0	-27.0	39.0
Food Container	A7	1011.0	22.0	8.0
Fecal Stowage Container	RHEB	1039.0	47.0	12.0
PGA Container	On Aft Bulkhead Under Center Couch	1015.0	0.0	-20.0
Forward Hatch Container	Under LH Couch	1018.0	-24.5	-15.0
Container, R12 (In-flight Location)	RH Girth Ring	1034.0	41.0	-21.0
Helmet Stowage & Accessory Bags (In-flight Location) - LH	U2	1033.0	-23.0	-50.0
Helmet Stowage and Accessory Bags (In-flight Location) - Ctr.	B1	1050.0	-27.0	39.0
Helmet Stowage and Accessory Bags (In-flight Location) - RH	L3	1048.0	-47.0	12.0
CO2 Absorbers (2)	In ECU	1031.0	-48.3	19.6
CO2 Absorbers (2)	A1	1011.0	-21.0	-22.0
CO2 Absorbers (4)	A3	1016.0	-24.0	28.0
CO2 Absorbers (4)	A4	1015.0	-7.0	28.0
CO2 Absorbers (4)	A5	1015.0	9.0	28.0
CO2 Absorbers (4)	A6	1017.0	26.0	28.0
CO2 Absorbers (4)	A9	1013.0	0.0	16.0
CO2 Absorbers (4)	B5	1031.0	-8.0	39.0
CO2 Absorbers (4)	B6	1031.0	13.0	39.0
	Order of Locations Used in Sequential Mass Properties Tables for CO2 Absorbed			
First 8.0 lb CO2 Absorbed	B5	1031.0	-8.0	39.0
Second 16.0 lb CO2 Absorbed	(B6, A9)	1022.0	6.5	27.5
Remainder CO2 Absorbed	Composite Location	1016.8	-6.1	22.2

TABLE 3.1-9.1

MISSION J-1 LUNAR MODULE STOWAGE VOLUME CENTROIDS

LM-10

AREA		X	Y	Z
A1B		262.8	-20.8	15.4
A1C	ICG Assy	240.5	-15.3	13.3
A1C		240.5	-18.0	13.3
A1D		270.3	-15.0	19.0
A1E		265.9	-20.7	-6.0
A1F		257.4	-20.7	-6.0
A1G		257.5	-20.0	-18.0
A1H		265.9	-20.0	-18.0
A1K		281.0	-20.0	-8.5
A1L		273.7	-20.0	-8.5
A2		260.0	-37.0	28.0
A3		280.0	0	-10.0
A4		244.1	-3.5	13.5
A5		224.3	-1.5	29.3
A10		250.0	8.8	-11.8
A11	PLSS LiOH Cart	263.6	18.8	-2.4
A11	ECS LiOH Cart	261.2	20.7	5.9
A12		272.0	0	-18.0
A13		300.0	0	0
A14A		238.0	-9.2	-14.8
F1A		244.5	-36.6	31.4
F1B		235.5	-35.5	38.5
F1C		242.5	-35.6	38.6
F1D		242.8	-35.4	47.2
F1E		237.9	-33.6	55.0
F1F		235.5	-37.6	46.6
F1G		228.0	-40.2	43.2
F5		286.0	17.8	66.6
F6		270.3	0	52.8
F6B		270.3	0	52.8
F6C		270.3	0	52.8
F7A		238.0	38.0	49.8
F7B		238.0	38.0	49.8
F7C		238.0	38.0	41.0
F7D		238.0	38.0	38.4
F7E		238.0	38.0	32.7
F7F		238.0	38.0	31.6
F7H		238.0	38.0	45.5
F7J		238.0	38.0	39.2
F7K		238.0	38.0	42.7

TABLE 3.1-9.1 (CONCLUDED)

MISSION J-1 LUNAR MODULE STOWAGE VOLUME CENTROIDS

LM-10

AREA	X	Y	Z
F7L	236.0	36.0	48.0
F7N	238.0	38.0	53.1
F7P	238.0	38.0	53.4
F8	221.0	18.0	51.0
F9	219.7	0	44.7
F10	221.0	-18.0	51.0

TABLE 3.1-9.2

MISSION J-1 TRANSFERABLE EQUIPMENT

REFERENCE CODE EXPLANATION

The reference table used with this Transferable Equipment List is a directory of information sources from which data for each item were obtained. It is intended to define the exact source for each portion of the data used. This reference table is correlated to each item in the Transferable Equipment List by a 3-digit reference code number.

The code is the form 3 1 6

Item Identification Source

1. The Apollo Stowage List for each mission prepared bi-weekly for MSC by the Boeing Company
2. The Apollo Flight Plan prepared for each mission by the Flight Planning Branch of NASA
3. The LM Lunar Surface Checklist prepared by EVA branch of NASA
4. Telecom with responsible MSC Apollo Division/Contractor
5. Apollo Operations Handbook

Weight Source

1. The Apollo Stowage List
2. The Boeing Company
3. North American Rockwell
4. Grumman Company
5. Telecom with Responsible MSC Apollo Division/Contractor
6. Estimated by TRW

Center of Gravity Source

1. Command module stowage volume centroids supplied by NR
2. The Boeing Company
3. Grumman Company
4. Telecom with responsible MSC Apollo Division/Contractor
5. Determined from mock-up
6. Estimated by TRW
7. Data response from NR

TABLE 3.1-9.2 (CONTINUED)

MISSICN J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO FIRST MID-COURSE CORRECTION (1)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
CREW-COMMAND MODULE PILOT(CMP)	TBD	227	1	ON COUCH(CTR CRW.STA	155.0	1043.0	.0	-10.4
CREW-COMMANDER (CDR)	TBD	227	1	ON COUCH(LH CREW STA	183.0	1043.0	-24.5	-10.4
SUNGLASSES	A0200.	111	1	ON CREW-CDR(LH STA)	.1	1043.0	-24.5	-10.4
SUNGLASSES	A0200.	111	1	ON CREW-CMP(CTR STA)	.1	1043.0	.0	-10.4
POUCH,SUNGLASSES	A0201.	111	1	ON CREW-CDR(LH STA)	NEGL	1043.0	-24.5	-10.4
POUCH,SUNGLASSES	A0201.	111	1	ON CREW-CMP(CTR STA)	NEGL	1043.0	.0	-10.4
CHRONOGRAPH - 002	A0202.	111	1	ON CREW-CDR(LH STA)	.1	1043.0	-24.5	-10.4
CHRCNOGRAPH - 002	A0202.	111	1	ON CREW-CMP(CTR STA)	.1	1043.0	.0	-10.4
WATCHBAND	A0203.	111	1	ON CREW-CDR(LH STA)	NEGL	1043.0	-24.5	-10.4
WATCHBAND	A0203.	111	1	ON CREW-CMP(CTR STA)	NEGL	1043.0	.0	-10.4
PENS,DATA RECORDING	A0204.	111	1	ON CREW-CDR(LH STA)	.1	1043.0	-24.5	-10.4
PENS,DATA RECORDING	A0204.	111	1	ON CREW-CMP(CTR STA)	.1	1043.0	.0	-10.4
PEN,MARKER	A0205.	111	1	ON CREW-CDR(LH STA)	NEGL	1043.0	-24.5	-10.4
PEN,MARKER	A0205.	111	1	ON CREW-CMP(CTR STA)	NEGL	1043.0	.0	-10.4
PENCIL	A0206.	111	1	ON CREW-CDR(LH STA)	.1	1043.0	-24.5	-10.4
PENCIL	A0206.	111	1	CN CREW-CMP(CTR STA)	.1	1043.0	.0	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA(CREW-CTR STA)	.1	1043.0	.0	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-LH STA)	.1	1043.0	-24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-RH STA)	.1	1043.0	24.5	-10.4
BAG,HELMET STOW,INFLIGHT	B0105.	115	1	AREA U2	.6	1033.0	-23.0	-50.0
BAG,HELMET STOW,INFLIGHT	B0105.	115	1	AREA U2	.6	1033.0	-23.0	-50.0
BAG,HELMET STOW,INFLIGHT	B0105.	115	1	AREA U2	.6	1033.0	-23.0	-50.0
BAG,ACCESSORY	B0105.1	115	1	IN HSB (U2)	.3	1033.0	-23.0	-50.0
BAG,ACCESSORY	B0105.1	115	1	IN HSB (U2)	.3	1033.0	-23.0	-50.0
BAG,ACCESSORY	B0105.1	115	1	IN HSB (U2)	.3	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO FIRST MID-COURSE CORRECTION (1)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
HARNESS,CWG ELECTRICAL (CMP)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
OPS CONTROL UNIT ADAPTER	B0151.	111	1	AREA A2	1.4	1011.0	-22.0	8.0
STRAPS,ATTACH,OPS/PGA	B0152.	111	2	AREA A2	NEGL	1011.0	-22.0	8.0
STRAPS,ATTACH,OPS/PGA	B0153.	111	1	AREA A2	NEGL	1011.0	-22.0	8.0
VEST,DUAL LIFE	B0202.	111	1	ON CREW-CMP(CTR STA)	2.4	1043.0	.0	-10.4
VEST,DUAL LIFE	B0202.	111	1	ON CREW-CDR(LH STA)	2.4	1043.0	-24.5	-10.4
VEST,DUAL LIFE	B0202.	111	1	ON CREW-LMP(RH STA)	2.4	1043.0	24.5	-10.4
UCTA	B0205.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
UCTA	B0205.	111	1	ON CREW-CDR(LH STA)	.5	1043.0	-24.5	-10.4
UCTA	B0205.	111	1	ON CREW-CMP(CTR STA)	.5	1043.0	.0	-10.4
PENLIGHTS	B0206.	111	1	ON CREW-CDR(LH STA)	.3	1043.0	-24.5	-10.4
PENLIGHTS	B0206.	111	1	ON CREW-CMP(CTR STA)	.3	1043.0	.0	-10.4
BIOBELT ASSY	B0207.	111	1	ON CREW-CDR(LH STA)	.2	1043.0	-24.5	-10.4
BIOBELT ASSY	B0207.	111	1	ON CREW-CMP(CTR STA)	.2	1043.0	.0	-10.4
GARMENT,CONSTANT WEAR	B0208.	111	1	ON CREW-CDR(LH STA)	.8	1043.0	-24.5	-10.4
GARMENT,CONSTANT WEAR	B0208.	111	1	ON CREW-CMP(CTR STA)	.8	1043.0	.0	-10.4
EARPLUGS,PAIR	B0210.	111	1	ON CREW-CDR(LH STA)	NEGL	1043.0	-24.5	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-CDR(LH STA)	45.2	1043.0	-24.5	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-LMP(RH STA)	45.2	1043.0	24.5	-10.4
ITLSA,IV CMP	B0212.	111	1	ON CREW-CMP(CTR STA)	39.9	1043.0	.0	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CMP(CTR STA)	2.0	1043.0	.0	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CDR(LH STA)	2.0	1043.0	-24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-LMP(RH STA)	2.0	1043.0	24.5	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO FIRST MID-COURSE CORRECTION (1)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CMP(CTR STA)	2.6	1043.0	.0	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CDR(LH STA)	2.6	1043.0	-24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-LMP(RH STA)	2.6	1043.0	24.5	-10.4
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW-CDR(LH STA)	.5	1043.0	-24.5	-10.4
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW-CMP(CTR STA)	.5	1043.0	.0	-10.4
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW-CDR(LH STA)	.3	1043.0	-24.5	-10.4
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW-CMP(CTR STA)	.3	1043.0	.0	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-LMP(RH STA)	1.6	1043.0	24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-CDR(LH STA)	1.6	1043.0	-24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-CMP(CTR STA)	1.6	1043.0	.0	-10.4
POCKET,SCISSORS (CMP)	B0218.	111	1	ON CREW-CMP(CTR STA)	.2	1043.0	.0	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON CREW-CDR(LH STA)	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON CREW-LMP(RH STA)	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON CREW-CDR(LH STA)	.2	1043.0	-24.5	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON CREW-LMP(RH STA)	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON CREW-CDR(LH STA)	TBD	1043.0	-24.5	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON CREW-LMP(RH STA)	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON CREW-CMP(CTR STA)	.2	1043.0	.0	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON CREW-CMP(CTR STA)	TBD	1043.0	.0	-10.4
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW-CMP(CTR STA)	1.1	1043.0	.0	-10.4
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW-CDR(LH STA)	1.1	1043.0	-24.5	-10.4
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW-CDR(LH STA)	.4	1043.0	-24.5	-10.4
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW-CMP(CTR STA)	.4	1043.0	.0	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(STOWED)	NEGL	1015.0	.0	-19.0
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(STOWED)	NEGL	1015.0	.0	-19.0
HEADSET,LIGHTWEIGHT	E0111.	111	1	AREA A8	.4	1011.0	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0112.	111	1	AREA A8	.4	1011.0	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0113.	111	1	AREA A8	.4	1011.0	21.0	-23.0
EARTUBE,UNIVERSAL (CMP)	E0114.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
EARTUBE,UNIVERSAL (CDR)	E0115.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
EARTUBE,UNIVERSAL (LMP)	E0116.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO FIRST MID-COURSE CORRECTION (1)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
EARPIECE,MOULDER (COM.CARRIER)	E0200.1	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	ON CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	1	ON CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
PANEL IND.-VERB/NCUN LIST	H0104.	115	1	GNIC PANEL	.2	1050.0	.0	22.0
CONTAINER,R12	00344.	115	1	AREA R3	2.7	1072.0	26.0	9.0
CM EQUIP.RELOC.1					531.75	1042.62	-9.14	-11.48

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO FIRST MID-COURSE CORRECTION (2)

APOLLO COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
CREW-COMMAND MODULE PILOT(CMP)	TBD	227	1	ON COUCH(LH CREW STA	159.0	1043.0	-24.5	-10.4
CREW-COMMANDER (CDR)	TBD	227	1	ON COUCH(CTR CRW.STA	183.0	1043.0	.0	-10.4
SUNGLASSES	A0200.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
SUNGLASSES	A0200.	111	1	ON CREW-CMP(LH STA)	.1	1043.0	-24.5	-10.4
POUCH,SUNGLASSES	A0201.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
POUCH,SUNGLASSES	A0201.	111	1	ON CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
CHRONOGRAPH - 002	A0202.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
CHRONOGRAPH - 002	A0202.	111	1	ON CREW-CMP(LH STA)	.1	1043.0	-24.5	-10.4
WATCHBAND	A0203.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
WATCHBAND	A0203.	111	1	ON CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
PENS,DATA RECORDING	A0204.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
PENS,DATA RECORDING	A0204.	111	1	ON CREW-CMP(LH STA)	.1	1043.0	-24.5	-10.4
PEN,MARKER	A0205.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
PEN,MARKER	A0205.	111	1	ON CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
PENCIL	A0206.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
PENCIL	A0206.	111	1	ON CREW-CMP(LH STA)	.1	1043.0	-24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,HELMET STOW,INFLIGHT	B0105.	115	1	AREA U2	.6	1033.0	-23.0	-50.0
BAG,HELMET STOW,INFLIGHT	B0105.	115	1	AREA B1	.6	1050.0	-27.0	39.0
BAG,HELMET STOW,INFLIGHT	B0105.	115	1	AREA L3	.6	1048.0	-47.0	12.0
BAG,ACCESSORY	B0105.1	115	1	AREA U2	.3	1033.0	-23.0	-50.0
BAG,ACCESSORY	B0105.1	115	1	AREA B1	.3	1050.0	-27.0	39.0
BAG,ACCESSORY	B0105.1	115	1	AREA L3	.3	1048.0	-47.0	12.0
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO FIRST MID-COURSE CORRECTION (2)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
HARNESS,CWG ELECTRICAL (CMP)	B0135.	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
OPS CONTROL UNIT ADAPTER	B0151.	111	1	AREA A7	1.4	1011.0	22.0	8.0
STRAPS,ATTACH,OPS/PGA	B0152.	111	2	AREA A7	NEGL	1011.0	22.0	8.0
STRAPS,ATTACH,OPS/PGA	B0153.	111	1	AREA A7	NEGL	1011.0	22.0	8.0
VEST,DUAL LIFE	B0202.	111	1	IN HSB (U2)	2.4	1033.0	-23.0	-50.0
VEST,DUAL LIFE	B0202.	111	1	IN HSB (U2)	2.4	1033.0	-23.0	-50.0
VEST,DUAL LIFE	B0202.	111	1	IN HSB (U2)	2.4	1033.0	-23.0	-50.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
PENLIGHTS	B0206.	111	1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
PENLIGHTS	B0206.	111	1	ON CREW-CMP(LH STA)	.3	1043.0	-24.5	-10.4
BIOBELT ASSY	B0207.	111	1	ON CREW-CDR(CTR.STA)	.2	1043.0	.0	-10.4
BIOBELT ASSY	B0207.	111	1	ON CREW-CMP(LH STA)	.2	1043.0	-24.5	-10.4
GARMENT,CONSTANT WEAR	B0208.	111	1	ON CREW-CDR(CTR.STA)	.8	1043.0	.0	-10.4
GARMENT,CONSTANT WEAR	B0208.	111	1	ON CREW-CMP(LH STA)	.8	1043.0	-24.5	-10.4
EARPLUGS,PAIR	B0210.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0
ITLSA,IV CMP	B0212.	111	1	ITLSA IN PGA CONT.	39.9	1011.0	.0	-20.0
GLOVES,IV PAIR	B0213.	111	1	IN HSB (U2)	2.0	1033.0	-23.0	-50.0
GLOVES,IV PAIR	B0213.	111	1	IN HSB (U2)	2.0	1033.0	-23.0	-50.0
GLOVES,IV PAIR	B0213.	111	1	IN HSB (U2)	2.0	1033.0	-23.0	-50.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO FIRST MID-COURSE CORRECTION (2)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
HELMET ASSY, PRESSURE	B0214.	111	1	IN HSB (U2)	2.6	1033.0	-23.0	-50.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW BAG (B1)	2.6	1050.0	-27.0	39.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET.STOW.BAG (L3)	2.6	1048.0	-47.0	12.0
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW-CMP(LH STA)	.5	1043.0	-24.5	-10.4
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW-CMP(LH STA)	.3	1043.0	-24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	IN HSB (U2)	1.6	1033.0	-23.0	-50.0
COMMUNICATION CARRIER	B0217.	111	1	HELMET STOW BAG (B1)	1.6	1050.0	-27.0	39.0
COMMUNICATION CARRIER	B0217.	111	1	HELMET STOW.BAG (L3)	1.6	1048.0	-47.0	12.0
POCKET,SCISSORS (CMP)	B0218.	111	1	ON ICG-CMP./LH STA.	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON ICG-CDR./CTR.STA.	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON ICG-LMP./RH STA.	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON ICG-CDR./CTR.STA.	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON ICG-LMP./RH STA.	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON ICG-CDR./CTR.STA.	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON ICG-LMP./RH STA.	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON ICG-CMP./LH STA.	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON ICG-CMP./LH STA.	TBD	1043.0	-24.5	-10.4
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW-CMP(LH STA)	1.1	1043.0	-24.5	-10.4
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW-CDR(CTR.STA)	1.1	1043.0	.0	-10.4
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(CREW-CDR)	NEGL	1043.0	.0	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(CREW-LMP)	NEGL	1043.0	24.5	-10.4
HEADSET,LIGHTWEIGHT	E0111.	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
HEADSET,LIGHTWEIGHT	E0112.	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
HEADSET,LIGHTWEIGHT	E0113.	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
EARTUBE,UNIVERSAL (CMP)	E0114.	111	1	ON ICG-CMP./LH STA.	NEGL	1043.0	-24.5	-10.4
EARTUBE,UNIVERSAL (CDR)	E0115.	111	1	ON ICG-CDR./CTR.STA.	NEGL	1043.0	.0	-10.4
EARTUBE,UNIVERSAL (LMP)	E0116.	111	1	ON ICG-LMP./RH STA.	NEGL	1043.0	24.5	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO FIRST MID-COURSE CORRECTION (2)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
EARPIECE,MOULDER (COM.CARRIER)	E0200.1	111	1	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
EARTUBE (COM.CARRIER)	E0200.2	111	2	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
EARTUBE (COM.CARRIER)	E0200.2	111	2	HELMET STOW BAG (B1)	NEGL	1050.0	-27.0	39.0
EARTUBE (COM.CARRIER)	E0200.2	111	1	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
PANEL IND.-VERB/NOUN LIST	H0104.	115	1	DATA CARD KIT (R3)	.2	1072.0	26.0	9.0
CONTAINER,R12	00344.	115	1	RH GIRTH RING	2.7	1034.0	41.0	-21.0
CM EQUIP.RELOC.1					531.75	1034.71	-8.74	-13.45

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO LM ACTIVATION (3)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
GARMENT,LIQUID COOLING CDR	B0107.	111	1	AREA U1	4.3	1033.0	23.0	-50.0
GARMENT,LIQUID COOLING LMP	B0107.	111	1	AREA U1	4.3	1033.0	23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	AREA A2	.3	1011.0	-22.0	8.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	AREA A2	.3	1011.0	-22.0	8.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	1	AREA A2	.3	1011.0	-22.0	8.0
HARNESS,CWG ELECTRICAL (CMP)	B0135.	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
GARMET,CONSTANT WEAR	B0208.	111	1	ON CREW-LMP(RH STA)	.8	1043.0	24.5	-10.4
GARMENT,CONSTANT WEAR	B0208.	111	1	ON CREW-CDR(CTR.STA)	.8	1043.0	.0	-10.4
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO LM ACTIVATION (3)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0
ITLSA,IV CMP	B0212.	111	1	ITLSA IN PGA CONT.	39.9	1011.0	.0	-20.0
GLOVES,IV PAIR	B0213.	111	1	IN HSB (U2)	2.0	1033.0	-23.0	-50.0
GLOVES,IV PAIR	B0213.	111	1	IN HSB (U2)	2.0	1033.0	-23.0	-50.0
GLOVES,IV PAIR	B0213.	111	1	IN HSB (U2)	2.0	1033.0	-23.0	-50.0
HELMET ASSY, PRESSURE	B0214.	111	1	IN HSB (U2)	2.6	1033.0	-23.0	-50.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW BAG (B1)	2.6	1050.0	-27.0	39.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW.BAG (L3)	2.6	1048.0	-47.0	12.0
COMMUNICATION CARRIER	B0217.	111	1	IN HSB (U2)	1.6	1033.0	-23.0	-50.0
COMMUNICATION CARRIER	B0217.	111	1	HELMET STOW BAG (B1)	1.6	1050.0	-27.0	39.0
COMMUNICATION CARRIER	B0217.	111	1	HELMET STOW.BAG (L3)	1.6	1048.0	-47.0	12.0
POCKET,SCISSORS (CMP)	B0218.	111	1	ON ICG-CMP./LH STA.	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON ICG-CDR./CTR.STA.	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON ICG-LMP./RH STA.	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON ICG-CDR./CTR.STA.	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON ICG-LMP./RH STA.	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON ICG-CDR./CTR.STA.	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON ICG-LMP./RH STA.	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON ICG-CMP./LH STA.	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON ICG-CMP./LH STA.	TBD	1043.0	-24.5	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(CREW-CDR)	NEGL	1043.0	.0	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(CREW-LMP)	NEGL	1043.0	24.5	-10.4
HEADSET,LIGHTWEIGHT	E0111.	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
HEADSET,LIGHTWEIGHT	E0112.	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
HEADSET,LIGHTWEIGHT	E0113.	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
EARTUBE,UNIVERSAL (CMP)	E0114.	111	1	ON ICG-CMP./LH STA.	NEGL	1043.0	-24.5	-10.4
EARTUBE,UNIVERSAL (CDR)	E0115.	111	1	ON ICG-CDR./CTR.STA.	NEGL	1043.0	.0	-10.4
EARTUBE,UNIVERSAL (LMP)	E0116.	111	1	ON ICG-LMP./RH STA.	NEGL	1043.0	24.5	-10.4
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO LM ACTIVATION (3)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
EARPIECE,MOULDER (COM.CARRIER)	E0200.1	111	1	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
EARTUBE (COM.CARRIER)	E0200.2	111	2	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
EARTUBE (COM.CARRIER)	E0200.2	111	2	HELMET STOW BAG (B1)	NEGL	1050.0	-27.0	39.0
EARTUBE (COM.CARRIER)	E0200.2	111	1	IN HSB (U2)	NEGL	1033.0	-23.0	-50.0
WATER SYS ASSY,RETURN CONTIN.	06444.	111	1	IN CM PGA CONTAINER	9.0	1015.0	.0	-20.0
CM EQUIP.RELOC.2					187.64	1018.27	-1.85	-19.88

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO LM ACTIVATION (4)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-RH STA)	.1	1043.0	24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-LH STA)	.1	1043.0	-24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA(CREW-CTR STA)	.1	1043.0	.0	-10.4
GARMENT,LIQUID COOLING CDR	B0107.	111	1	ON CREW-CDR(CTR.STA)	4.3	1043.0	.0	-10.4
GARMENT,LIQUID COOLING LMP	B0107.	111	1	ON CREW-LMP(RH STA)	4.3	1043.0	24.5	-10.4
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	1	ON CREW-CMP(LH STA)	.3	1043.0	-24.5	-10.4
HARNESS,CWG ELECTRICAL (CMP)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
UCTA	B0205.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
UCTA	B0205.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
UCTA	B0205.	111	1	ON CREW-CMP(LH STA)	.5	1043.0	-24.5	-10.4
GARMET,CONSTANT WEAR	B0208.	111	1	AREA U2	.8	1033.0	-23.0	-50.0
GARMENT,CONSTANT WEAR	B0208.	111	1	AREA U2	.8	1033.0	-23.0	-50.0
ITLSA - EV	B0211.	111	1	ON CREW-CDR(CTR.STA)	45.2	1043.0	.0	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO LM ACTIVATION (4)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
ITLSA - EV	B0211.	111	1	ON CREW-LMP(RH STA)	45.2	1043.0	24.5	-10.4
ITLSA,IV CMP	B0212.	111	1	ON CREW-CMP(LH STA)	39.9	1043.0	-24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CMP(LH STA)	2.0	1043.0	-24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	CN CREW-LMP(RH STA)	2.0	1043.0	24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	CN CREW-CDR(CTR.STA)	2.0	1043.0	.0	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	CN CREW-CMP(LH STA)	2.6	1043.0	-24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-LMP(RH STA)	2.6	1043.0	24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CDR(CTR.STA)	2.6	1C43.0	.0	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-CMP(LH STA)	1.6	1043.0	-24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	CN CREW-LMP(RH STA)	1.6	1043.0	24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	CN CREW-CDR(CTR.STA)	1.6	1043.C	.0	-10.4
POCKET,SCISSORS (CMP)	B0218.	111	1	ON PGA (CREW-LH STA)	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	CN PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	CN PGA(CREW-CTR STA)	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON PGA (CREW-RH STA)	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON PGA (CREW-LH STA)	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON PGA (CREW-LH STA)	TBD	1043.0	-24.5	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(STOWED)	NEGL	1015.0	.0	-19.0
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(STOWED)	NEGL	1015.0	.C	-19.0
HEADSET,LIGHTWEIGHT	E0111.	111	1	AREA A8	.4	1C11.C	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0112.	111	1	AREA A8	.4	1011.0	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0113.	111	1	AREA A8	.4	1011.0	21.0	-23.0
EARTUBE,UNIVERSAL (CMP)	E0114.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
EARTUBE,UNIVERSAL (CDR)	E0115.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
EARTUBE,UNIVERSAL (LMP)	E0116.	111	1	AREA U2	NEGL	1033.C	-23.C	-50.0
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	CN CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO LM ACTIVATION (4)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
EARPIECE,MOULDER (COM.CARRIER)	E0200.1	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	ON CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	1	ON CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
WATER SYS ASSY,RETURN CONTIN.	06444.	111	1	AFT UEB CENTER (APRX	9.0	1018.0	.0	-48.9
CM EQUIP.RELOC.2					187.64	1040.60	-.29	-15.53

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM CM INTO LM AT LM ACTIVATION (5)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
CREW-COMMANDER (CDR)	TBD	227	1	ON COUCH(CTR CRW.STA	183.0	1043.0	.0	-10.4
CREW-LM PILOT (LMP)	TBD	227	1	ON COUCH(RH CREW STA	162.0	1043.0	24.5	-10.4
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	5	AREA R13	5.0	1024.0	45.0	-26.0
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	2	AREA R13	2.0	1024.0	45.0	-26.0
MAGAZINE,16MM DATA ACQ.	A0101.1	116	1	AREA R13	1.0	1024.0	45.0	-26.0
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	3	AREA R13	4.2	1024.0	45.0	-26.0
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	1	AREA R13	1.4	1024.0	45.0	-26.0
MAGAZINE,L.S.HASSELBLAD	A0108.1	116	3	AREA R13	4.2	1024.0	45.0	-26.0
MAGAZINE,L.S.HASSELBLAD	A0108.1	111	6	VOLUME CENTROID CM	8.4	1040.6	.0	.0
LM LUNAR SURFACE CHECKLIST	A0114.10	114	1	IN FDF (R3)	1.0	1072.0	26.0	9.0
LM SYSTEMS ACTIVATION CHK.LST.	A0114.12	114	1	IN FDF (R3)	.5	1072.0	26.0	9.0
LM SYSTEMS ACTIVATION CHK.LST.	A0114.12	114	1	IN FDF (R3)	.5	1072.0	26.0	9.0
LM LUNAR SURFACE MAPS	A0114.13	114	1	IN FDF (R3)	1.5	1072.0	26.0	9.0
LM TIMELINE BOOK	A0114.14	114	1	IN FDF (R3)	.5	1072.0	26.0	9.0
LM XFR DATA CARD KIT	A0114.18	114	1	IN FDF (R3)	.6	1072.0	26.0	9.0
LM DATA CARD BOOK	A0114.19	114	1	IN FDF (R3)	.3	1072.0	26.0	9.0
LM RNDZ/ABORT BOOK	A0114.22	114	1	IN FDF (R3)	.3	1072.0	26.0	9.0
MONOCULAR 10X40	A0130.	116	1	AREA U4	.7	1038.0	39.0	-43.0
SUNGLASSES	A0200.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
SUNGLASSES	A0200.	111	1	ON CREW-LMP(RH STA)	.1	1043.0	24.5	-10.4
POUCH,SUNGLASSES	A0201.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
POUCH,SUNGLASSES	A0201.	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
CHRONOGRAPH - 002	A0202.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
CHRONOGRAPH - 002	A0202.	111	1	ON CREW-LMP(RH STA)	.1	1043.0	24.5	-10.4
WATCHBAND	A0203.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
WATCHBAND	A0203.	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
PENS,DATA RECORDING	A0204.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
PENS,DATA RECORDING	A0204.	111	1	ON CREW-LMP(RH STA)	.1	1043.0	24.5	-10.4
PEN,MARKER	A0205.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
PEN,MARKER	A0205.	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
PENCIL	A0206.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
PENCIL	A0206.	111	1	ON CREW-LMP(RH STA)	.1	1043.0	24.5	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM CM INTO LM AT LM ACTIVATION (5)

APOLLO COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
GARMENT,LIQUID COOLING CDR	B0107.	111	1	ON CREW-CDR(CTR.STA)	4.3	1043.0	.0	-10.4
GARMENT,LIQUID COOLING LMP	B0107.	111	1	ON CREW-LMP(RH STA)	4.3	1043.0	24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
SCISSORS	B0204.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
UCTA	B0205.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
UCTA	B0205.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
PENLIGHTS	B0206.	111	1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
PENLIGHTS	B0206.	111	1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
BIOBELT ASSY	B0207.	111	1	ON CREW-CDR(CTR.STA)	.2	1043.0	.0	-10.4
BIOBELT ASSY	B0207.	111	1	ON CREW-LMP(RH STA)	.2	1043.0	24.5	-10.4
EARPLUGS, PAIR	B0210.	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
EARPLUGS,PAIR	B0210.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-CDR(CTR.STA)	45.2	1043.0	.0	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-LMP(RH STA)	45.2	1043.0	24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-LMP(RH STA)	2.0	1043.0	24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CDR(CTR.STA)	2.0	1043.0	.0	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-LMP(RH STA)	2.6	1043.0	24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CDR(CTR.STA)	2.6	1043.0	.0	-10.4
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-LMP(RH STA)	1.6	1043.0	24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-CDR(CTR.STA)	1.6	1043.0	.0	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON PGA(CREW-CTR STA)	TBD	1043.0	.0	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM CM INTO LM AT LM ACTIVATION (5)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
POCKET,DATA (LMP)	B0220.	111	1	ON PGA (CREW-RH STA)	TBD	1043.0	24.5	-10.4
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW-CDR(CTR.STA)	1.1	1043.0	.0	-10.4
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW-LMP(RH STA)	1.1	1043.0	24.5	-10.4
DOSIMETER, PASSIVE RADIATION	D0101.	111	1	IN XFR BAG (R13)	NEGL	1024.0	45.0	-26.0
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(STOWED)	NEGL	1015.0	.0	-19.0
DOSIMETER, PASSIVE	D0201.	117	3	CWG POCKET(STOWED)	NEGL	1015.0	.0	-19.0
HEADSET,LIGHTWEIGHT	E0112.	111	1	AREA A8	.4	1011.0	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0113.	111	1	AREA A8	.4	1011.0	21.0	-23.0
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARPIECE,MOULDER (COM.CARRIER)	E0200.1	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
BAG,XFER, 16MM MAG (6)	06397.	111	1	IN XFR BAG (R13)	.3	1024.0	45.0	-26.0
BAG,XFER, 70MM MAG (4)	06398.	111	1	IN XFR BAG (R13)	.3	1024.0	45.0	-26.0
BAG, TRANSFER-16MM MAG.(2)	06432.	111	*1	AREA R13	.1	1024.0	45.0	-26.0
BAG, TRANSFER-70MM MAG (3)	06434.	111	*1	AREA R13	.5	1024.0	45.0	-26.0
2 CREW+EQUIP,CM-LM					500.63	1042.43	12.97	-10.70

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM CM INTO LM AT LM ACTIVATION (6)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	LM COORDINATES X-C.G.	Y-C.G.	Z-C.G.
CREW-COMMANDER (CDR)	TBD	227	1	LH CREW STATION-	183.0	252.0	-22.0	43.0
CREW-LM PILOT (LMP)	TBD	227	1	RH CREW STATION-	162.0	252.0	22.0	43.0
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	5	F7L	5.0	236.0	38.0	48.0
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	2	ISA (F6)	2.0	270.0	.0	52.8
MAGAZINE,16MM DATA ACQ.	A0101.1	116	1	F5	1.0	286.0	17.8	66.6
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	3	F7D	4.2	238.0	38.0	38.4
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	1	F7C	1.4	238.0	38.0	41.0
MAGAZINE,L.S.HASSELBLAD	A0108.1	116	3	F7P	4.2	238.0	38.0	53.4
MAGAZINE,L.S.HASSELBLAD	A0108.1	111	6	VOLUME CENTROID AS	8.4	254.0	.0	.0
LM LUNAR SURFACE CHECKLIST	A0114.10	114	1	LM XFR DATA CARD KIT	1.0	280.8	-20.0	14.0
LM SYSTEMS ACTIVATION CHK.LST.	A0114.12	114	1	LM XFR DATA CARD KIT	.5	280.8	-20.0	14.0
LM SYSTEMS ACTIVATION CHK.LST.	A0114.12	114	1	LM XFR DATA CARD KIT	.5	280.8	-20.0	14.0
LM LUNAR SURFACE MAPS	A0114.13	114	1	LM XFR DATA CARD KIT	1.5	280.8	-20.0	14.0
LM TIMELINE BOOK	A0114.14	114	1	LM XFR DATA CARD KIT	.5	280.8	-20.0	14.0
LM XFR DATA CARD KIT	A0114.18	114	1	LM XFR DATA CARD KIT	.6	280.8	-20.0	14.0
LM DATA CARD BOOK	A0114.19	114	1	LM XFR DATA CARD KIT	.3	280.8	-20.0	14.0
LM RNDZ/ABORT BOOK	A0114.22	114	1	LM XFR DATA CARD KIT	.3	280.8	-20.0	14.0
MONOCULAR 10X40	A0130.	116	1	F7B	.7	238.0	38.0	49.0
SUNGLASSES	A0200.	111	1	ON CREW(LH CREW STA)	.1	252.0	-22.0	43.0
SUNGLASSES	A0200.	111	1	ON CREW(RH CREW STA)	.1	252.0	22.0	43.0
POUCH,SUNGLASSES	A0201.	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
POUCH,SUNGLASSES	A0201.	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
CHRONOGRAPH - 002	A0202.	111	1	ON CREW(LH CREW STA)	.1	252.0	-22.0	43.0
CHRONOGRAPH - 002	A0202.	111	1	ON CREW(RH CREW STA)	.1	252.0	22.0	43.0
WATCHBAND	A0203.	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
WATCHBAND	A0203.	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
PENS,DATA RECORDING	A0204.	111	1	ON CREW(LH CREW STA)	.1	252.0	-22.0	43.0
PENS,DATA RECORDING	A0204.	111	1	ON CREW(RH CREW STA)	.1	252.0	22.0	43.0
PEN,MARKER	A0205.	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
PEN,MARKER	A0205.	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
PENCIL	A0206.	111	1	ON CREW(LH CREW STA)	.1	252.0	-22.0	43.0
PENCIL	A0206.	111	1	ON CREW(RH CREW STA)	.1	252.0	22.0	43.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM CM INTC LM AT LM ACTIVATION (6)

						LM COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
GARMENT,LIQUID COOLING CDR	B0107.	111	1	ON CREW(LH CREW STA)	4.3	252.0	-22.0	43.0
GARMENT,LIQUID COOLING LMP	B0107.	111	1	ON CREW(RH CREW STA)	4.3	252.0	22.0	43.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW(LH CREW STA)	.3	252.0	-22.0	43.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW(RH CREW STA)	.3	252.0	22.0	43.0
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	F1E	.4	237.9	-33.6	55.0
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	F1E	.4	237.9	-33.6	55.0
SCISSORS	B0204.	111	1	ON CREW(LH CREW STA)	.5	252.0	-22.0	43.0
UCTA	B0205.	111	1	ON PGA-LMP(ON CREW)	.5	252.0	22.0	43.0
UCTA	B0205.	111	1	ON PGA-CDR(ON CREW)	.5	252.0	-22.0	43.0
PENLIGHTS	B0206.	111	1	ON CREW(LH CREW STA)	.3	252.0	-22.0	43.0
PENLIGHTS	B0206.	111	1	ON CREW(RH CREW STA)	.3	252.0	22.0	43.0
BIOBELT ASSY	B0207.	111	1	ON CREW(LH CREW STA)	.2	252.0	-22.0	43.0
BIOBELT ASSY	B0207.	111	1	ON CREW(RH CREW STA)	.2	252.0	22.0	43.0
EARPLUGS, PAIR	B0210.	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
EARPLUGS,PAIR	B0210.	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
ITLSA - EV	B0211.	111	1	ON CREW(LH CREW STA)	45.2	252.0	-22.0	43.0
ITLSA - EV	B0211.	111	1	ON CREW(RH CREW STA)	45.2	252.0	22.0	43.0
GLOVES,IV PAIR	B0213.	111	1	ON CREW(RH CREW STA)	2.0	252.0	22.0	43.0
GLOVES,IV PAIR	B0213.	111	1	ON CREW(LH CREW STA)	2.0	252.0	-22.0	43.0
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW(RH CREW STA)	2.6	252.0	22.0	43.0
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW(LH CREW STA)	2.6	252.0	-22.0	43.0
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW(RH CREW STA)	.5	252.0	22.0	43.0
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW(LH CREW STA)	.5	252.0	-22.0	43.0
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW(RH CREW STA)	.3	252.0	22.0	43.0
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW(LH CREW STA)	.3	252.0	-22.0	43.0
COMMUNICATION CARRIER	B0217.	111	1	ON CREW(RH CREW STA)	1.6	252.0	22.0	43.0
COMMUNICATION CARRIER	B0217.	111	1	ON CREW(LH CREW STA)	1.6	252.0	-22.0	43.0
POCKET,SCISSORS (CDR)	B0218.	111	1	ON CREW(LH CREW STA)	.2	252.0	-22.0	43.0
POCKET,SCISSORS (LMP)	B0218.	111	1	ON CREW(RH CREW STA)	.2	252.0	22.0	43.0
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON CREW(LH CREW STA)	.2	252.0	-22.0	43.0
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON CREW(RH CREW STA)	.2	252.0	22.0	43.0
POCKET,DATA (CDR)	B0220.	111	1	ON CREW(LH CREW STA)	TBD	252.0	-22.0	43.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERREC CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM CM INTC LM AT LM ACTIVATION (6)

DESCRIPTION	STCW. ITEM	REF	NC.	STOWAGE LOCATION	WEIGHT	LM COORDINATES X-C.G.	Y-C.G.	Z-C.G.
POCKET,DATA (LMP)	B0220.	111	1	CN CREW(RH CREW STA)	TBD	252.0	22.0	43.0
ASSY, BIOINSTRUMENTATION	C0201.	111	1	CN CREW(LH CREW STA)	1.1	252.0	-22.0	43.0
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW(RH CREW STA)	1.1	252.0	22.0	43.0
DOSIMETER, PASSIVE RADIATION	D0101.	111	1	F7L	NEGL	236.0	38.0	48.0
DOSIMETER,PERSCNAL	D0200.	117	1	ON CREW(RH CREW STA)	.4	252.0	22.0	43.0
DOSIMETER,PERSONAL	D0200.	117	1	CN CREW(LH CREW STA)	.4	252.0	-22.0	43.0
DOSIMETER, PASSIVE	D0201.	117	3	CN CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
DOSIMETER, PASSIVE	D0201.	117	3	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
HEADSET,LIGHTWEIGHT	E0112.	111	1	F1B	.4	235.5	-35.5	38.5
HEADSET,LIGHTWEIGHT	E0113.	111	1	F1B	.4	235.5	-35.5	38.5
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	CN CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
EARPIECE,MOULDER (COM.CARRIER)	E0200.1	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
BAG,XFER, 16MM MAG (6)	06397.	111	1	F7L	.3	236.0	38.0	48.0
BAG,XFER, 70MM MAG (4)	06398.	111	1	F7C	.3	238.0	38.0	38.4
BAG, TRANSFER-16MM MAG.(2)	06432.	111	*1	ISA (F6)	.1	270.0	.0	52.8
BAG, TRANSFER-70MM MAG (3)	06434.	111	*1	F7P	.5	238.0	38.0	53.4
2 CREW+EQUIP,CM-LM					500.63	251.94	.03	42.19

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM LM INTO CM AT LM ACTIVATION (7)

LM COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
CSM/LM UMBILICAL	TBD	222	1	IN LM TUNNEL	1.1	300.0	.0	.0
EQUIP.XFR,LM-CM 1					1.10	300.00	.00	.00

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM LM INTO CM AT LM ACTIVATION (8)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
CSM/LM UMBILICAL	TBD	222	1	UNDER RH COUCH	1.1	1018.0	24.5	-15.0
EQUIP.XFR,LM-CM 1					1.10	1018.00	24.50	-15.00

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN LM PRIOR TO LM ACTIVATION (9)

						LM COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	2	ISA (F6)	2.0	270.0	.0	52.8
MAGAZINE,16MM DATA ACQ.	A0101.1	116	1	ISA (F6)	1.0	270.0	.0	52.8
BRACKET,WEDGE,16MM CAMERA	A1041.	115	1	F7A	1.3	238.0	38.0	49.8
OXYGEN PURGE SYSTEM (OPS)	B1059.	111	1	A1F	35.9	257.4	-20.7	-6.0
INTERIM STOWAGE ASSY.	03007.	111	* 1	F6	6.4	270.0	.0	52.8
BAG, TRANSFER-16MM MAG.(2)	06432.	111	*1	ISA (F6)	.1	270.0	.0	52.8
LM EQUIP.RELOC.1					46.70	259.42	-14.86	7.51

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN LM PRIOR TO LM ACTIVATION (10)

						LM COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	2	ISA (A1D)	2.0	270.3	-15.0	19.0
MAGAZINE,16MM DATA ACQ.	A0101.1	116	1	ISA (A1D)	1.0	270.3	-15.0	19.0
BRACKET,WEDGE,16MM CAMERA	A1041.	115	1	F5	1.3	286.0	17.8	66.6
OXYGEN PURGE SYSTEM (OPS)	B1059.	111	1	A9(APPROX.	35.9	278.0	.0	-20.0
INTERIM STOWAGE ASSY.	C3007.	111	* 1	A1D	6.4	270.3	-15.0	19.0
BAG, TRANSFER-16MM MAG.(2)	06432.	111	*1	ISA (A1D)	.1	270.3	-15.0	19.0
LM EQUIP.RELOC.1					46.70	276.66	-2.56	-9.66

TABLE 3.1-9.2 (CONTINUED)

MISSICN J-1 TRANSFERREC CREW AND EQUIPMENT STCWAGE LIST

ITEMS OFFLOADED FROM ASC. STAGE PRIOR TO LUNAR LIFT-OFF (11)

LM COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
ARM RESTS	TBD	346	2	LH CREW STATICN-	2.2	252.0	-22.0	43.0
ARM RESTS	TBD	346	2	RH CREW STATION-	2.2	252.0	22.0	43.0
LM SYSTEMS ACTIVATION CHK.LST.	A0114.12	114	1	LM XFR DATA CARD KIT	.5	280.8	-20.0	14.0
CAMERA,HASSELBLAD-ELEC DATA	A1015.	111	1	F7C	3.6	238.0	38.0	41.0
LENS, 60 MM	A1016.	115	1	F7C	1.7	238.0	38.0	41.0
PROTECTIVE COVERA, RESEAU	A1023.	115	1	F7C	.2	238.0	38.0	41.0
PROTECTIVE COVER,RESEAU	A1023.	111	1	A14A	.2	238.0	-9.2	-14.8
TRIGGER, ELECT. HASSELBLAD	A1027.	115	1	F7C	.2	238.0	38.0	41.0
TRIGGER,HASSELBLAD-ELEC DATA	A1027.	111	1	A14A	.2	238.C	-9.2	-14.8
HANDLE,, ELECT. HASSELBLAD	A1028.	115	1	F7C	.5	238.0	38.0	41.0
HANDLE,HASSELBLAD-ELEC DATA	A1028.	111	1	A14A	.5	238.0	-9.2	-14.8
TETHER, EVA RETRACTABLE	A1029.	115	1	A1B	.2	262.8	-20.8	15.4
CHECKLIST, EVA CUFF	A1040.	115	1	F8	.3	221.C	18.0	51.0
CHECKLIST, EVA CUFF	A1040.	115	1	F1C	.3	221.C	-18.0	51.0
TETHER,EVA RETRACTABLE	A1044.	111	1	F9	.7	219.7	.0	44.7
CAMERA,L.S.ELECTRIC	A1045.	111	1	A14A	3.1	238.0	-9.2	-14.8
LENS,500MM	A1046.	111	1	A14A	4.6	238.0	-9.2	-14.8
RINGSIGHT	A1047.	111	1	A14A	.1	238.0	-9.2	-14.8
GARMENT,LIQUID COOLING CDR	B0107.	111	1	ON CREW(LH CREW STA)	4.3	252.0	-22.0	43.0
GARMENT,LIQUID COOLING LMP	B0107.	111	1	CN CREW(RH CREW STA)	4.3	252.0	22.0	43.0
EARPLUGS, PAIR	B0210.	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
EARPLUGS,PAIR	B0210.	111	1	CN CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
REMOTE CONTROL UNIT-PLSS	B1001.	115	2	A12	10.2	272.0	.0	-18.0
BRACKET, CAMERA MOUNT	B1001.1	115	1	F7F	.6	238.0	38.0	31.6
BRACKET,CAMERA MOUNT	B1001.1	111	1	A14A	.6	238.0	-9.2	-14.8
UTILITY TOWEL ASSEMBLY, LM	B1008.	115	2	F1D	.6	242.8	-35.4	47.2
DEFECATION COLLECTION DEVICE	B1009.	115	6	F1F	1.2	235.5	-37.6	46.6
BCOTS,LUNAR PAIR	B1018.	115	1	A1L	4.5	273.7	-20.0	-8.5
BOOTS, LUNAR PAIR	B1018.	115	1	A1K	4.5	281.0	-20.0	-8.5
BAG ASSY, LEC + W.T.	B1020.1	115	1	F7N	.2	238.0	38.0	53.1
CCNVEYOR ASSY, LUNAR EQUIP.	B1020.2	115	1	F7N	1.3	238.0	38.0	53.1
BAG, DEPLOYMENT, LEC	B1020.3	115	1	F7N	.1	238.0	38.C	53.1

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS OFFLOADED FROM ASC. STAGE PRIOR TO LUNAR LIFT-OFF (11)

						LM COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
PLSS/EVCS ASSY	B1024.	114	1	F9	89.6	219.7	.0	44.7
PLSS/EVCS ASSY	B1025.	114	1	A18	89.6	262.8	-20.8	15.4
BAG, JETTISON STOWAGE	B1027.	115	3	A1G	2.7	257.5	-20.0	-18.0
DISPENSER,TISSUE	B1033.	116	1	F1E	1.4	237.9	-33.6	55.0
ADAPTER,LIQUID COOLING GARMENT	B1036.	116	2	F7E	.4	238.0	38.0	32.7
JACKET ASSY, ICG	B1039.1	116	2	A1C (ICG ASSY)	3.6	240.5	-15.3	13.3
TROUSER ASSY, ICG	B1039.2	116	2	A1C (ICG ASSY)	3.6	240.5	-15.3	13.3
BOOT, RIGHT, ICG	B1039.3	116	2	A1C (ICG ASSY)	.8	240.5	-15.3	13.3
BOOT, LEFT, ICG	B1039.4	116	2	A1C (ICG ASSY)	.8	240.5	-15.3	13.3
TOWELS,LM UTILITY(RED)	B1043.	115	2	F1G	.2	228.0	-40.2	43.2
TOWELS,LM UTILITY(BLUE)	B1044.	115	2	F1G	.2	228.0	-40.2	43.2
DEVICE,IN-SUIT DRINKING	B1048.	114	2	F6	1.6	270.0	.0	52.8
BUDDY SLSS ASSY SPLY(BUD.SYS.)	B1052.	116	1	A5	10.9	224.3	-1.5	29.3
SLEEP RESTRAINT ASSY	B1061.	111	2	VOLUME CENTROID AS	5.2	254.0	.0	.0
HARNESS,GEOLOGICAL EQUIP (CDR)	B1063.	111	1	A5	1.5	224.3	-1.5	29.3
HARNESS,GEOLOGICAL EQUIP (LMP)	B1064.	111	1	A5	1.5	224.3	-1.5	29.3
FOOD ASSY, LM	C1002.	165	1	A9(APPROX.	3.3	278.0	.0	-20.0
WIPES, WET, FACIAL	C1005.0	115	5	F1A	NEGL	244.5	-36.6	31.4
CONTR.CONTINGNCY,LUN.SAM.RTN.	G4016.	115	1	A1G	.6	257.5	-20.0	-18.0
SCALE, SAMPLE	G4031.	115	1	F7K	.5	238.0	38.0	42.7
ADAPTER, SRC/OPS	C3004.	115	1	A1F	2.4	257.4	-20.7	-6.0
ADAPTER, SRC/OPS	C3004.	115	1	VOLUME CENTROID AS	2.4	254.0	.0	.0
CANISTER, ECS LIOH	C3008.	115	1	A1D	9.2	270.3	-15.0	19.0
URINE COLLECTION ASSY.	C3009.	115	1	F1F	.3	235.5	-37.6	46.6
BAG, EMESIS	C3011.	115	1	F1F	.2	235.5	-37.6	46.6
STRAP, ECS LICH CANNISTER	C3024.	115	1	A1C	.1	250.0	8.8	-11.8
URINE RECEPTACLE SYSTEM	C3039.	115	1	F1C	.6	242.5	-35.6	38.5
HAMMOCK ASSY.	C3048.	115	1	F1G	4.1	228.0	-40.2	43.2
HAMMOCK ASSY.	C3050.	115	1	F1G	3.9	228.0	-40.2	43.2
CONTAINER,BUDDY SLSS ASSY,STOW	C3059.	111	1	A5	4.0	224.3	-1.5	29.3
SUPPORT ASSY,EQUIPMENT	C3073.	111	1	A14A	TBD	238.0	-9.2	-14.8
LEFT AT LUNAR SITE					298.91	244.28	-9.02	24.56

TABLE 3.1-9.2 (CONTINUED)

MISSICN J-1 TRANSFERREC CREW AND EQUIPMENT STOWAGE LIST

ITEMS ONLOADED INTO ASC. STAGE PRIOR TO LUNAR LIFT-OFF (12)

DESCRIPTION	STCW. ITEM	REF	NO.	STCWAGE LOCATION	WEIGHT	LM COORDINATES		
						X-C.G.	Y-C.G.	Z-C.G.
CONTAINER,SAMPLE RET NO 1 (LD)	G4003.	115	1	A1E	39.1	265.9	-20.7	-6.0
CONTAINER,SAMPLE RET NO 2 (LD)	G4004.	115	1	A1F	39.1	257.4	-20.7	-6.0
EXP,SOLAR WIND COMPOSITION	G4011.	111	1	ISA (A3)	.2	280.0	.0	-10.0
CONTR.CONTINGNCY,LUN.SAM.RTN.	G4016.	115	1	A1G	2.6	257.5	-20.0	-18.0
BAG,EXTRA SAMPLE COLLECTION	G4048.	115	4	ISA (A3)	4.8	280.0	.0	-10.0
PENETROMETER,RECORDING	G4049.	111	1	VOLUME CENTRCID AS	2.0	254.0	.0	.0
BAG,SWC EXPERIMENT - STOWAGE	G4055.	111	1	ISA (A3)	.2	280.0	.0	-10.0
BAG,SAMPLE RETURN	03060.	115	1	ON PLUS Z27 BULKHEAD	15.0	260.0	-37.0	28.0
CONTAINER,CORE TUBE + SAMPLE	03074.	115	1	A14A	18.0	238.0	-9.2	-14.8
SAMPLES IN G4048.	G4048.1	115	1	ISA (A3)	35.2	280.0	.0	-10.0
BAG,CORE TUBE	03074.1	115	1	A14A	2.0	238.0	-9.2	-14.8
ONLCAD AT LUN.SITE					158.20	263.02	-15.23	-5.03

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN LM PRIOR TO LUNAR LIFT-OFF (13)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	LM COORDINATES X-C.G.	Y-C.G.	Z-C.G.
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	2	ISA (A1D)	2.0	270.3	-15.0	19.0
MAGAZINE,16MM DATA ACQ.	A0101.1	116	1	ISA (A1D)	1.0	270.3	-15.0	19.0
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	1	F7C	1.4	238.0	38.0	41.0
OXYGEN PURGE SYSTEM	B1012.	115	1	A1E	35.9	265.9	-20.7	-6.0
LUNAR EXTRAVEHICULAR VISOR	B1014.	115	1	F8	5.6	221.0	18.0	51.0
LUNAR EXTRAVEHICULAR VISOR	B1014.	115	1	F10	5.6	221.0	-18.0	51.0
GLOVES,EV-PAIR	B1015.	115	1	F8	2.7	221.0	18.0	51.0
GLOVES,EV-PAIR	B1015.	115	1	F10	2.7	221.0	-18.0	51.0
KIT,EMU MAINTENANCE	B1016.	115	1	F10	.5	221.0	-18.0	51.0
PURGE VALVE ASSY.	B1017.	115	1	A1L	.6	273.7	-20.0	-8.5
PURGE VALVE ASSY.	B1017.	115	1	A1K	.6	281.0	-20.0	-8.5
STRAPS,ATTACH,PLSS,LOWER(LH)	B1021.	115	1	F9	.2	219.7	.0	44.7
STRAPS,ATTACH,PLSS,LOWER(LH)	B1021.	115	1	A1B	.2	262.8	-20.8	15.4
STRAPS,ATTACH,PLSS,LOWER(RH)	B1022.	115	1	F9	.3	219.7	.0	44.7
STRAPS,ATTACH,PLSS,LOWER(RH)	B1022.	115	1	A1B	.3	262.8	-20.8	15.4
GARMENT,LIQUID COOLING	B1030.	111	1	A1C	4.3	240.5	-18.0	13.3
GARMENT,LIQUID COOLING	B1030.	111	1	A1C	4.3	240.5	-18.0	13.3
BAG, HELMET STOWAGE	B1058.	115	* 1	F8	1.4	221.0	18.0	51.0
BAG, HELMET STOWAGE	B1058.	115	1	F10	1.4	221.0	-18.0	51.0
INTERIM STOWAGE ASSY.	03007.	111	* 1	A1C	6.4	270.3	-15.0	19.0
BAG, TEMPORARY STOWAGE	03031.	111	1	F6B	.9	270.3	.0	52.8
BAG, TRANSFER-16MM MAG.(2)	06432.	111	*1	ISA (A1D)	.1	270.3	-15.0	19.0
LM EQUIP.RELOC.2					78.40	251.66	-13.15	15.55

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN LM PRIOR TO LUNAR LIFT-OFF (14)

LM COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	2	ISA (A3)	2.0	280.0	.0	-10.0
MAGAZINE,16MM DATA ACQ.	A0101.1	116	1	ISA (A3)	1.0	280.0	.0	-10.0
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	1	F7D	1.4	238.0	38.0	38.4
OXYGEN PURGE SYSTEM	B1012.	115	1	F9	35.9	219.7	.0	44.7
LUNAR EXTRAVEHICULAR VISOR	B1014.	115	1	A3	5.6	280.0	.0	-10.0
LUNAR EXTRAVEHICULAR VISOR	B1014.	115	1	A3	5.6	280.0	.0	-10.0
GLOVES,EV-PAIR	B1015.	115	1	A3	2.7	280.0	.0	-10.0
GLOVES,EV-PAIR	B1015.	115	1	A3	2.7	280.0	.0	-10.0
KIT,EMU MAINTENANCE	B1016.	115	1	A3	.5	280.0	.0	-10.0
PURGE VALVE ASSY.	B1017.	115	1	F7P	.6	238.0	38.0	53.4
PURGE VALVE ASSY.	B1017.	115	1	F7P	.6	238.0	38.0	53.4
STRAPS,ATTACH,PLSS,LOWER(LH)	B1021.	115	1	F7P	.2	238.0	38.0	53.4
STRAPS,ATTACH,PLSS,LOWER(LH)	B1021.	115	1	F7P	.2	238.0	38.0	53.4
STRAPS,ATTACH,PLSS,LOWER(RH)	B1022.	115	1	F7P	.3	238.0	38.0	53.4
STRAPS,ATTACH,PLSS,LOWER(RH)	B1022.	115	1	F7P	.3	238.0	38.0	53.4
GARMENT,LIQUID COOLING	B1030.	111	1	ON CREW(RH CREW STA)	4.3	252.0	22.0	43.0
GARMENT,LIQUID COOLING	B1030.	111	1	ON CREW(LH CREW STA)	4.3	252.0	-22.0	43.0
BAG, HELMET STOWAGE	B1058.	115	* 1	A3	1.4	280.0	.0	-10.0
BAG, HELMET STOWAGE	B1058.	115	1	A3	1.4	280.0	.0	-10.0
INTERIM STOWAGE ASSY.	03007.	111	* 1	A3	6.4	280.0	.0	-10.0
BAG, TEMPORARY STOWAGE	03031.	111	1	A3	.9	280.0	.0	-10.0
BAG, TRANSFER-16MM MAG.(2)	06432.	111	*1	ISA (A3)	.1	280.0	.0	-10.0
LM EQUIP.RELOC.2					78.40	247.39	1.74	23.50

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM ASC. STAGE INTO CM PRIOR TO ASC. STAGE JETTISON (15)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	LM COORDINATES X-C.G.	Y-C.G.	Z-C.G.
CREW-COMMANDER (CDR)	TBD	227	1	LH CREW STATION-	183.0	252.0	-22.0	43.0
CREW-LM PILOT (LMP)	TBD	227	1	RH CREW STATION-	162.0	252.0	22.0	43.0
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	5	F7L	5.0	236.0	38.0	48.0
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	2	ISA (A3)	2.0	280.0	.0	-10.0
MAGAZINE,16MM DATA ACQ.	A0101.1	116	1	ISA (A3)	1.0	280.0	.0	-10.0
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	3	F7D	4.2	238.0	38.0	38.4
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	1	F7D	1.4	238.0	38.0	38.4
MAGAZINE,L.S.HASSELBLAD	A0108.1	116	3	F7D	4.2	238.0	38.0	38.4
MAGAZINE,L.S.HASSELBLAD	A0108.1	111	6	VOLUME CENTROID AS	8.4	254.0	.0	.0
LM LUNAR SURFACE CHECKLIST	A0114.10	114	1	LM XFR DATA CARD KIT	1.0	280.8	-20.0	14.0
LM SYSTEMS ACTIVATION CHK.LST.	A0114.12	114	1	LM XFR DATA CARD KIT	.5	280.8	-20.0	14.0
LM LUNAR SURFACE MAPS	A0114.13	114	1	LM XFR DATA CARD KIT	1.5	280.8	-20.0	14.0
LM TIMELINE BOOK	A0114.14	114	1	LM XFR DATA CARD KIT	.5	280.8	-20.0	14.0
LM XFR DATA CARD KIT	A0114.18	114	1	LM XFR DATA CARD KIT	.6	280.8	-20.0	14.0
LM DATA CARD BOOK	A0114.19	114	1	LM XFR DATA CARD KIT	.3	280.8	-20.0	14.0
LM RNDZ/ABORT BOOK	A0114.22	114	1	LM XFR DATA CARD KIT	.3	280.8	-20.0	14.0
MONOCULAR 10X40	A0130.	116	1	F7B	.7	238.0	38.0	49.0
SUNGLASSES	A0200.	111	1	ON CREW(LH CREW STA)	.1	252.0	-22.0	43.0
SUNGLASSES	A0200.	111	1	ON CREW(RH CREW STA)	.1	252.0	22.0	43.0
POUCH,SUNGLASSES	A0201.	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
POUCH,SUNGLASSES	A0201.	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
CHRONOGRAPH - 002	A0202.	111	1	ON CREW(LH CREW STA)	.1	252.0	-22.0	43.0
CHRONOGRAPH - 002	A0202.	111	1	ON CREW(RH CREW STA)	.1	252.0	22.0	43.0
WATCHBAND	A0203.	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
WATCHBAND	A0203.	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
PENS,DATA RECORDING	A0204.	111	1	ON CREW(LH CREW STA)	.1	252.0	-22.0	43.0
PENS,DATA RECORDING	A0204.	111	1	ON CREW(RH CREW STA)	.1	252.0	22.0	43.0
PEN,MARKER	A0205.	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
PEN,MARKER	A0205.	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
PENCIL	A0206.	111	1	ON CREW(LH CREW STA)	.1	252.0	-22.0	43.0
PENCIL	A0206.	111	1	ON CREW(RH CREW STA)	.1	252.0	22.0	43.0
KIT, PILOTS PREFERENCE	A1007.	111	2	A1H	1.8	265.9	-20.0	-18.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM ASC. STAGE INTO CM PRIOR TO ASC. STAGE JETTISON (15)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	LM COORDINATES X-C.G.	Y-C.G.	Z-C.G.
KIT, PILOTS PREFERENCE	A1007.	111	1	A1H	.9	265.9	-20.0	-18.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW(LH CREW STA)	.3	252.0	-22.0	43.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW(RH CREW STA)	.3	252.0	22.0	43.0
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	F1E	.4	237.9	-33.6	55.0
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	F1E	.4	237.9	-33.6	55.0
SCISSORS	B0204.	111	1	ON CREW(LH CREW STA)	.5	252.0	-22.0	43.0
UCTA	B0205.	111	1	ON CREW(RH CREW STA)	.5	252.0	22.0	43.0
UCTA	B0205.	111	1	ON CREW(LH CREW STA)	.5	252.0	-22.0	43.0
PENLIGHTS	B0206.	111	1	ON CREW(RH CREW STA)	.3	252.0	22.0	43.0
PENLIGHTS	B0206.	111	1	ON CREW(LH CREW STA)	.3	252.0	-22.0	43.0
BIOBELT ASSY	B0207.	111	1	ON CREW(RH CREW STA)	.2	252.0	22.0	43.0
BIOBELT ASSY	B0207.	111	1	ON CREW(LH CREW STA)	.2	252.0	-22.0	43.0
ITLSA - EV	B0211.	111	1	ON CREW(RH CREW STA)	45.2	252.0	22.0	43.0
ITLSA - EV	B0211.	111	1	ON CREW(LH CREW STA)	45.2	252.0	-22.0	43.0
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW(RH CREW STA)	.5	252.0	22.0	43.0
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW(LH CREW STA)	.5	252.0	-22.0	43.0
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW(RH CREW STA)	.3	252.0	22.0	43.0
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW(LH CREW STA)	.3	252.0	-22.0	43.0
POCKET,DATA (LMP)	B0220.	111	1	ON CREW(RH CREW STA)	TBD	252.0	22.0	43.0
OXYGEN PURGE SYSTEM	B1012.	115	1	F9	35.9	219.7	.0	44.7
LUNAR EXTRAVEHICULAR VISOR	B1014.	115	1	A3	5.6	280.0	.0	-10.0
LUNAR EXTRAVEHICULAR VISOR	B1014.	115	1	A3	5.6	280.0	.0	-10.0
GLOVES,EV-PAIR	B1015.	115	1	A3	2.7	280.0	.0	-10.0
GLOVES,EV-PAIR	B1015.	115	1	A3	2.7	280.0	.0	-10.0
KIT,EMU MAINTENANCE	B1016.	115	1	A3	.5	280.0	.0	-10.0
PURGE VALVE ASSY.	B1017.	115	1	F7P	.6	238.0	38.0	53.4
TETHER, WAIST EVA	B1020.6	115	1	F7N	.6	238.0	38.0	53.1
TETHER, WAIST EVA	B1020.7	115	1	F7N	.6	238.0	38.0	53.1
GARMENT,LIQUID COOLING	B1030.	111	1	ON CREW(RH CREW STA)	4.3	252.0	22.0	43.0
GARMENT,LIQUID COOLING	B1030.	111	1	ON CREW(LH CREW STA)	4.3	252.0	-22.0	43.0
BAG, HELMET STOWAGE	B1058.	115	* 1	A3	1.4	280.0	.0	-10.0
BAG, HELMET STOWAGE	B1058.	115	1	A3	1.4	280.0	.0	-10.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW ANC EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM ASC. STAGE INTO CM PRIOR TO ASC. STAGE JETTISON (15)

						LM COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW(LH CREW STA)	1.1	252.0	-22.0	43.0
ASSY, BICINSTRUMENTATION	C0201.	111	1	CN CREW(RH CREW STA)	1.1	252.0	22.0	43.0
DOSIMETER, PASSIVE RADIATION	C0101.	111	1	F7L	NEGL	236.0	38.0	48.0
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW(RH CREW STA)	.4	252.0	22.0	43.0
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW(LH CREW STA)	.4	252.0	-22.0	43.0
DOSIMETER, PASSIVE	D0201.	117	3	CN CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
DOSIMETER, PASSIVE	D0201.	117	3	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
HEADSET,LIGHTWEIGHT	E0111.	111	1	F1B	.4	235.5	-35.5	38.5
HEADSET,LIGHTWEIGHT	E0112.	111	1	F1B	.4	235.5	-35.5	38.5
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	ON CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
EARPIECE,MOULDER (COM.CARRIER)	E0200.1	111	1	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
EARTUBE (COM.CARRIER)	E0200.2	111	2	CN CREW(RH CREW STA)	NEGL	252.0	22.0	43.0
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW(LH CREW STA)	NEGL	252.0	-22.0	43.0
CONTAINER,SAMPLE RET NO 1 (LD)	G4003.	115	1	A1E	39.1	265.9	-20.7	-6.0
CONTAINER,SAMPLE RET NO 2 (LD)	G4004.	115	1	A1F	39.1	257.4	-20.7	-6.0
EXP,SOLAR WIND COMPOSITION	G4011.	111	1	ISA (A3)	.2	280.0	.0	-10.0
CONTR.CONTINGNCY,LUN.SAM.RTN.	G4016.	115	1	A1G	2.6	257.5	-20.0	-18.0
BAG,EXTRA SAMPLE COLLECTION	G4048.	115	4	ISA (A3)	4.8	280.0	.0	-10.0
PENETROMETER,RECORDING	G4049.	111	1	VOLUME CENTROID AS	2.0	254.0	.0	.0
BAG,SWC EXPERIMENT - STOWAGE	G4055.	111	1	ISA (A3)	.2	280.0	.0	-10.0
FLAG KIT,STANDARD	N1002.	166	1	A1H	.8	265.9	-20.0	-18.0
DSEA	03005.	115	1	VOLUME CENTROID AS	2.3	254.0	.0	.0
INTERIM STOWAGE ASSY.	03007.	111	* 1	A3	6.4	280.0	.0	-10.0
BAG,SAMPLE RETURN	03060.	115	1	ON PLUS Z27 BULKHEAD	15.0	260.0	-37.0	28.0
CONTAINER,CORE TUBE + SAMPLE	03074.	115	1	A14A	18.0	238.0	-9.2	-14.8
BAG,XFER, 16MM MAG (6)	06397.	111	1	F7L	.3	236.0	38.0	48.0
BAG,XFER, 70MM MAG (4)	06398.	111	1	F7D	.3	238.0	38.0	38.4
BAG, TRANSFER-16MM MAG.(2)	06432.	111	*1	ISA (A3)	.1	280.0	.0	-10.0
BAG, TRANSFER-70MM MAG (3)	06434.	111	*1	F7P	.5	238.0	38.0	53.4
SAMPLES IN G4048.	G4048.1	115	1	ISA (A3)	35.2	280.0	.0	-10.0
BAG,CORE TUBE	03074.1	115	1	A14A	2.0	238.0	-9.2	-14.8
2 CREW+EQUIP,LM-CM					714.92	253.85	-3.36	29.16

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM ASC. STAGE INTO CM PRIOR TO ASC. STAGE JETTISON (16)

APOLLO COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
CREW-COMMANDER (CDR)	TBD	227	1	ON COUCH(CTR CRW.STA	183.0	1043.0	.0	-10.4
CREW-LM PILOT (LMP)	TBD	227	1	ON COUCH(RH CREW STA	162.0	1043.0	24.5	-10.4
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	5	IN XFR BAG (R13)	5.0	1024.0	45.0	-26.0
MAGAZINE, 16MM DATA ACQ.	A0101.1	116	2	AREA R13	2.0	1024.0	45.0	-26.0
MAGAZINE,16MM DATA ACQ.	A0101.1	116	1	AREA R13	1.0	1024.0	45.0	-26.0
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	3	AREA R13	4.2	1024.0	45.0	-26.0
MAGAZINE, L.S. HASSELBLAD	A0108.1	116	1	AREA R13	1.4	1024.0	45.0	-26.0
MAGAZINE,L.S.HASSELBLAD	A0108.1	116	3	AREA R13	4.2	1024.0	45.0	-26.0
MAGAZINE,L.S.HASSELBLAD	A0108.1	111	6	VOLUME CENTROID CM	8.4	1040.6	.0	.0
LM LUNAR SURFACE CHECKLIST	A0114.10	114	1	IN FDF (R3)	1.0	1072.0	26.0	9.0
LM SYSTEMS ACTIVATION CHK.LST.	A0114.12	114	1	IN FDF (R3)	.5	1072.0	26.0	9.0
LM LUNAR SURFACE MAPS	A0114.13	114	1	IN FDF (R3)	1.5	1072.0	26.0	9.0
LM TIMELINE BOOK	A0114.14	114	1	IN FDF (R3)	.5	1072.0	26.0	9.0
LM XFR DATA CARD KIT	A0114.18	114	1	IN FDF (R3)	.6	1072.0	26.0	9.0
LM DATA CARD BOOK	A0114.19	114	1	IN FDF (R3)	.3	1072.0	26.0	9.0
LM RNDZ/ABORT BOOK	A0114.22	114	1	IN FDF (R3)	.3	1072.0	26.0	9.0
MONOCULAR 10X40	A0130.	116	1	AREA U4	.7	1038.0	39.0	-43.0
SUNGLASSES	A0200.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
SUNGLASSES	A0200.	111	1	ON CREW-LMP(RH STA)	.1	1043.0	24.5	-10.4
POUCH,SUNGLASSES	A0201.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
POUCH,SUNGLASSES	A0201.	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
CHRONOGRAPH - 002	A0202.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
CHRONOGRAPH - 002	A0202.	111	1	ON CREW-LMP(RH STA)	.1	1043.0	24.5	-10.4
WATCHBAND	A0203.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
WATCHBAND	A0203.	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
PENS,DATA RECORDING	A0204.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
PENS,DATA RECORDING	A0204.	111	1	ON CREW-LMP(RH STA)	.1	1043.0	24.5	-10.4
PEN,MARKER	A0205.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
PEN,MARKER	A0205.	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
PENCIL	A0206.	111	1	ON CREW-CDR(CTR.STA)	.1	1043.0	.0	-10.4
PENCIL	A0206.	111	1	ON CREW-LMP(RH STA)	.1	1043.0	24.5	-10.4
KIT, PILOTS PREFERENCE	A1007.	111	2	AREA A8	1.8	1011.0	21.0	-23.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM ASC. STAGE INTO CM PRIOR TO ASC. STAGE JETTISON (16)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
KIT, PILOTS PREFERENCE	A1007.	111	1	AREA A8	.9	1011.0	21.0	-23.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
SCISSORS	B0204.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
UCTA	B0205.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
UCTA	B0205.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
PENLIGHTS	B0206.	111	1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
PENLIGHTS	B0206.	111	1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
BIOBELT ASSY	B0207.	111	1	ON CREW-LMP(RH STA)	.2	1043.0	24.5	-10.4
BIOBELT ASSY	B0207.	111	1	ON CREW-CDR(CTR.STA)	.2	1043.0	.0	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-LMP(RH STA)	45.2	1043.0	24.5	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-CDR(CTR.STA)	45.2	1043.0	.0	-10.4
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
HARNESS, ELEC.-SUIT	B0215.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
HARNESS, BIOINSTRUMENTATION	B0216.	111	1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON CREW-LMP(RH STA)	TBD	1043.0	24.5	-10.4
OXYGEN PURGE SYSTEM	B1012.	115	1	AREA A7	35.9	1011.0	22.0	8.0
LUNAR EXTRAVEHICULAR VISOR	B1014.	115	1	IN CM PGA CONTAINER	5.6	1015.0	.0	-20.0
LUNAR EXTRAVEHICULAR VISOR	B1014.	115	1	IN CM PGA CONTAINER	5.6	1015.0	.0	-20.0
GLOVES,EV-PAIR	B1015.	115	1	IN CM PGA CONTAINER	2.7	1015.0	.0	-20.0
GLOVES,EV-PAIR	B1015.	115	1	IN CM PGA CONTAINER	2.7	1015.0	.0	-20.0
KIT,EMU MAINTENANCE	B1016.	115	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
PURGE VALVE ASSY.	B1017.	115	1	AREA A7	.6	1011.0	22.0	8.0
TETHER, WAIST EVA	B1020.6	115	1	AREA A7	.6	1011.0	22.0	8.0
TETHER, WAIST EVA	B1020.7	115	1	AREA A7	.6	1011.0	22.0	8.0
GARMENT,LIQUID COOLING	B1030.	111	1	ON CREW-LMP(RH STA)	4.3	1043.0	24.5	-10.4
GARMENT,LIQUID COOLING	B1030.	111	1	ON CREW-CDR(CTR.STA)	4.3	1043.0	.0	-10.4
BAG, HELMET STOWAGE	B1058.	115	* 1	IN CM PGA CONTAINER	1.4	1015.0	.0	-20.0
BAG, HELMET STOWAGE	B1058.	115	1	IN CM PGA CONTAINER	1.4	1015.0	.0	-20.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM ASC. STAGE INTO CM PRIOR TO ASC. STAGE JETTISON (16)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW-CDR(CTR.STA)	1.1	1043.0	.0	-10.4
ASSY, BIOINSTRUMENTATION	C0201.	111	1	ON CREW-LMP(RH STA)	1.1	1043.0	24.5	-10.4
DOSIMETER, PASSIVE RADIATION	D0101.	111	1	IN XFR BAG (R13)	NEGL	1024.0	45.0	-26.0
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
DOSIMETER,PERSONAL	D0200.	117	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
DOSIMETER, PASSIVE	D0201.	117	3	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
HEADSET,LIGHTWEIGHT	E0111.	111	1	AREA A8	.4	1011.0	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0112.	111	1	AREA A8	.4	1011.0	21.0	-23.0
EARPIECE,MOULDED (COM.CARRIER)	E0200.1	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARPIECE,MOULDER (COM.CARRIER)	E0200.1	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARTUBE (COM.CARRIER)	E0200.2	111	2	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
CONTAINER,SAMPLE RET NO 1 (LD)	G4003.	115	1	AREA B5	39.1	1031.0	-8.0	39.0
CONTAINER,SAMPLE RET NO 2 (LD)	G4004.	115	1	AREA B6	39.1	1031.0	13.0	39.0
EXP,SOLAR WIND COMPOSITION	G4011.	111	1	ISA (A2)	.2	1019.0	-22.0	8.0
CONTR.CONTINGNCY,LUN.SAM.RTN.	G4016.	115	1	AREA R13	2.6	1024.0	45.0	-26.0
BAG,EXTRA SAMPLE COLLECTION	G4048.	115	4	ISA (A2)	4.8	1019.0	-22.0	8.0
PENETROMETER,RECORDING	G4049.	111	1	AREA A7	2.0	1011.0	22.0	8.0
BAG,SWC EXPERIMENT - STOWAGE	G4055.	111	1	ISA (A2)	.2	1019.0	-22.0	8.0
FLAG KIT,STANDARD	N1002.	166	1	AREA A8	.8	1011.0	21.0	-23.0
DSEA	03005.	115	1	AREA A8	2.3	1011.0	21.0	-23.0
INTERIM STOWAGE ASSY.	03007.	111	* 1	AREA A2	6.4	1011.0	-22.0	8.0
BAG,SAMPLE RETURN	03060.	115	1	ON AREA A7	15.0	1019.0	22.0	8.0
CONTAINER,CORE TUBE + SAMPLE	03074.	115	1	AREA A9	18.0	1013.0	.0	16.0
BAG,XFER, 16MM MAG (6)	06397.	111	1	AREA R13	.3	1024.0	45.0	-26.0
BAG,XFER, 70MM MAG (4)	06398.	111	1	AREA R13	.3	1024.0	45.0	-26.0
BAG, TRANSFER-16MM MAG.(2)	06432.	111	*1	AREA R13	.1	1024.0	45.0	-26.0
BAG, TRANSFER-70MM MAG (3)	06434.	111	*1	AREA R13	.5	1024.0	45.0	-26.0
SAMPLES IN G4048.	G4048.1	115	1	ISA (A2)	35.2	1019.0	-22.0	8.0
BAG,CORE TUBE	03074.1	115	1	AREA A9	2.0	1013.0	.0	16.0
2 CREW+EQUIP,LM-CM					714.92	1035.40	5.69	-2.30

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM CM INTO ASC. STAGE PRIOR TO ASC. STAGE JETTISON (17)

APOLLO COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
CSM/LM UMBILICAL	TBD	222	1	UNDER RH COUCH	1.1	1018.0	24.5	-15.0
BAG, JETTISON STOWAGE	80147.	111	1	AREA A2	.9	1011.0	-22.0	8.0
FOOD PACKAGE	C0111.	111	1	AREA A7	50.0	1011.0	22.0	8.0
CO2 ABORBER USED	00327.	121	4	AREA B5	28.0	1031.0	-8.0	39.0
CO2 ABORBER USED	00327.	121	4	AREA B6	28.0	1031.0	13.0	39.0
CO2 ABORBER USED	00327.	121	4	AREA A9	28.0	1013.0	.0	16.0
SHIM, CO2 ABSORBER	00328.	161	4	AREA B5	.8	1031.0	-8.0	39.0
SHIM, CO2 ABSORBER	00328.	161	4	AREA B6	.8	1031.0	13.0	39.0
SHIMS,CO2 ABSORBER	00328.	161	4	AREA A9	.8	1013.0	.0	16.0
CONTAINER,B5	00342.	111	1	AREA B5	14.5	1031.0	-8.0	39.0
CONTAINER,B6	00343.	111	1	AREA B6	14.5	1031.0	13.0	39.0
DOCKING PROBE AND MECHANISM	00349.	222	1	IN CM TUNNEL	199.3	1110.3	.0	.0
CONTAINER,A9	06348.	111	1	AREA A9	14.7	1013.0	.0	16.0
BAG,FECAL COLLECTION ASSY.	06418.	111	1	AREA A7	1.1	1011.0	22.0	8.0
BAG,FECAL BAG XFR	06453.	111	1	IN CM PGA CONTAINER	2.0	1015.0	.0	-20.0
EQUIP.XFR. CM-LM					384.50	1067.24	3.51	11.53

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM CM INTO ASC. STAGE PRIOR TO ASC. STAGE JETTISON (18)

LM COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
DOCKING STRUCTURE	TBD	111	1	IN LM TUNNEL	111.7	314.7	.0	.0
CSM/LM UMBILICAL	TBD	222	1	IN LM TUNNEL	1.1	300.0	.0	.0
BAG, JETTISON STOWAGE	B0147.	111	1	VOLUME CENTROID AS	.9	254.0	.0	.0
FOOD PACKAGE	C0111.	111	1	VOLUME CENTROID AS	50.0	254.0	.0	.0
CO2 ABORBER USED	00327.	121	4	VOLUME CENTROID AS	28.0	254.0	.0	.0
CO2 ABORBER USED	00327.	121	4	VOLUME CENTROID AS	28.0	254.0	.0	.0
CO2 ABORBER USED	00327.	121	4	VOLUME CENTROID AS	28.0	254.0	.0	.0
SHIM, CO2 ABSORBER	00328.	161	4	VOLUME CENTROID AS	.8	254.0	.0	.0
SHIM, CO2 ABSORBER	00328.	161	4	VOLUME CENTROID AS	.8	254.0	.0	.0
SHIMS,CO2 ABSORBER	00328.	161	4	VOLUME CENTROID AS	.8	254.0	.0	.0
CONTAINER,B5	00342.	111	1	VOLUME CENTROID AS	14.5	254.0	.0	.0
CONTAINER,B6	00343.	111	1	VOLUME CENTROID AS	14.5	254.0	.0	.0
DOCKING PROBE	00349.	222	1	VOLUME CENTROID AS	87.6	254.0	.0	.0
CONTAINER,A9	06348.	111	1	VOLUME CENTROID AS	14.7	254.0	.0	.0
BAG,FECAL COLLECTION ASSY.	06418.	111	1	VOLUME CENTROID AS	1.1	254.0	.0	.0
BAG,FECAL BAG XFR	06453.	111	1	VOLUME CENTROID AS	2.0	254.0	.0	.0
EQUIP.XFR. CM-LM					384.50	271.77	.00	.00

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN ASC. STAGE PRIOR TO ASC. STAGE JETTISON (19)

						LM COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
DOCKING DROGUE	F1000.	112	1	IN LM TUNNEL	21.4	300.0	.0	.0
LM EQUIP.RELOC.3					21.40	300.00	.00	.00

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN ASC. STAGE PRIOR TO ASC. STAGE JETTISON (20)

						LM COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
DOCKING DROGUE	F1000.	112	1	ON CABN FLOOR/DROGUE	21.4	218.5	-19.6	47.6
LM EQUIP.RELOC.3					21.40	218.50	-19.60	47.60

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM POST A/S JETTISON (21)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-LH STA)	.1	1043.0	-24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-RH STA)	.1	1043.0	24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA(CREW-CTR STA)	.1	1043.0	.0	-10.4
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	1	ON CREW-CMP(LH STA)	.3	1043.0	-24.5	-10.4
HARNESS,CWG ELECTRICAL (CMP)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	IN ADAPTER BAG(A8)	.4	1011.0	21.0	-23.0
TETHER,WRIST EVA,WITH BAG	B1054.	111	1	AREA A2	.3	1011.0	-22.0	8.0
UCTA	B0205.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
UCTA	B0205.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
UCTA	B0205.	111	1	ON CREW-CMP(LH STA)	.5	1043.0	-24.5	-10.4
GARMET,CONSTANT WEAR	B0208.	111	1	AREA U2	.8	1033.0	-23.0	-50.0
GARMENT,CONSTANT WEAR	B0208.	111	1	AREA U2	.8	1033.0	-23.0	-50.0
ITLSA - EV	B0211.	111	1	ON CREW-LMP(RH STA)	45.2	1043.0	24.5	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-CDR(CTR.STA)	45.2	1043.0	.0	-10.4
ITLSA,IV CMP	B0212.	111	1	ON CREW-CMP(LH STA)	39.9	1043.0	-24.5	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM POST A/S JETTISON (21)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CMP(LH STA)	2.0	1043.0	-24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-LMP(RH STA)	2.0	1043.0	24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CDR(CTR.STA)	2.0	1043.0	.0	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CMP(LH STA)	2.6	1043.0	-24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-LMP(RH STA)	2.6	1043.0	24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CDR(CTR.STA)	2.6	1043.0	.0	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-CMP(LH STA)	1.6	1043.0	-24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-LMP(RH STA)	1.6	1043.0	24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-CDR(CTR.STA)	1.6	1043.0	.0	-10.4
POCKET,SCISSORS (CMP)	B0218.	111	1	ON PGA (CREW-LH STA)	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON PGA(CREW-CTR STA)	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON PGA (CREW-RH STA)	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON PGA (CREW-LH STA)	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON PGA (CREW-LH STA)	TBD	1043.0	-24.5	-10.4
GARMENT,LIQUID COOLING	B1030.	111	1	ON CREW-LMP(RH STA)	4.3	1043.0	24.5	-10.4
GARMENT,LIQUID COOLING	B1030.	111	1	ON CREW-CDR(CTR.STA)	4.3	1043.0	.0	-10.4
HEADSET,LIGHTWEIGHT	E0111.	111	1	AREA A8	.4	1011.0	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0112.	111	1	AREA A8	.4	1011.0	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0113.	111	1	AREA A8	.4	1011.0	21.0	-23.0
EARTUBE,UNIVERSAL (CMP)	E0114.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
EARTUBE,UNIVERSAL (CDR)	E0115.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
EARTUBE,UNIVERSAL (LMP)	E0116.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
DECON.BAG,CONTIN.LUNAR SRC	D6329.	111	1	AREA A2	.1	1011.0	-22.0	8.0
DECON.BAG,L.S. HASSELBLAD MAG.	D6330.	111	1	AREA A2	.2	1011.0	-22.0	8.0
BAG,DECONTAMINATION,SRC NO. 1	D6331.	111	1	AREA A2	.9	1011.0	-22.0	8.0
BAG,DECONTAMINATION,SRC NO. 2	D6331.	111	1	AREA A2	.9	1011.0	-22.0	8.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM POST A/S JETTISON (21)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NC.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
CONTAINGR,EVA EQUIPMENT	06358	111	1	AREA A2	2.5	1011.0	-22.0	8.0
CARRIER ASSY, CONT. A9	06403.	111	1	AREA A9	NEGL	1013.0	.0	16.0
BAG,DECON,LUNAR SAMPLE	06426.	111	1	AREA A2	5.0	1011.0	-22.0	8.0
BAG,DECON,ISA	06427.	111	1	AREA A2	5.0	1011.0	-22.0	8.0
TETHER,IV CREWMAN	06429.	111	1	AREA A2	.5	1011.0	-22.0	8.0
BAG, DECONTAMINATION 16MM MAG.	06433.	111	1	AREA A2	.3	1011.0	-22.0	8.0
BAG, DECONTAMINATION 70MM MAG.	06435.	111	1	AREA A2	.3	1011.0	-22.0	8.0
CM EQUIP.RELCC.3					194.63	1039.21	-2.09	-12.05

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM POST A/S JETTISON (22)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	AREA A2	.3	1011.0	-22.0	8.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	AREA A2	.3	1011.0	-22.0	8.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	1	AREA A2	.3	1011.0	-22.0	8.0
HARNESS,CWG ELECTRICAL (CMP)	B0135.	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
HARNESS,CWG ELECTRICAL (CDR)	B0135.	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
HARNESS,CWG ELECTRICAL (LMP)	B0135.	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
TETHER,WRIST EVA,WITH BAG	B1054.	111	1	AREA A7	.3	1011.0	22.0	8.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
GARMET,CONSTANT WEAR	B0208.	111	1	ON CREW-LMP(RH STA)	.8	1043.0	24.5	-10.4
GARMENT,CONSTANT WEAR	B0208.	111	1	ON CREW-CDR(CTR.STA)	.8	1043.0	.0	-10.4
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0
ITLSA,IV CMP	B0212.	111	1	SLEEP RESTRAINT - RT	39.9	1018.0	23.0	-50.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM POST A/S JETTISON (22)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
GLOVES,IV PAIR	B0213.	111	1	HELMET STOW.BAG (L3)	2.0	1048.0	-47.0	12.0
GLOVES,IV PAIR	B0213.	111	1	HELMET STOW BAG (B1)	2.0	1050.0	-27.0	39.0
GLOVES,IV PAIR	B0213.	111	1	AFT UPR EQUIP.BAY-RH	2.0	1020.0	25.0	-22.0
HELMET ASSY, PRESSURE	B0214.	111	1	AFT UPR EQUIP.BAY-RH	2.6	1020.0	25.0	-22.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW BAG (B1)	2.6	1050.0	-27.0	39.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW.BAG (L3)	2.6	1048.0	-47.0	12.0
COMMUNICATION CARRIER	B0217.	111	1	GNIC PANEL	1.6	1050.0	.0	22.0
COMMUNICATION CARRIER	B0217.	111	1	GNIC PANEL	1.6	1050.0	.0	22.0
COMMUNICATION CARRIER	B0217.	111	1	GNIC PANEL	1.6	1050.0	.0	22.0
POCKET,SCISSORS (CMP)	B0218.	111	1	ON ICG-CMP./LH STA.	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON ICG-CDR./CTR.STA.	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON ICG-LMP./RH STA.	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON ICG-CDR./CTR.STA.	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON ICG-LMP./RH STA.	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON ICG-CDR./CTR.STA.	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON ICG-LMP./RH STA.	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON ICG-CMP./LH STA.	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON ICG-CMP./LH STA.	TBD	1043.0	-24.5	-10.4
GARMENT,LIQUID COOLING	B1030.	111	1	AREA U1	4.3	1033.0	23.0	-50.0
GARMENT,LIQUID COOLING	B1030.	111	1	AREA U1	4.3	1033.0	23.0	-50.0
HEADSET,LIGHTWEIGHT	E0111.	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
HEADSET,LIGHTWEIGHT	E0112.	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
HEADSET,LIGHTWEIGHT	E0113.	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
EARTUBE,UNIVERSAL (CMP)	E0114.	111	1	ON CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
EARTUBE,UNIVERSAL (CDR)	E0115.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARTUBE,UNIVERSAL (LMP)	E0116.	111	1	ON CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
DECON.BAG,CONTIN.LUNAR SRC	06329.	111	1	AREA R13	.1	1024.0	45.0	-26.0
DECON.BAG,L.S. HASSELBLAD MAG.	06330.	111	1	AREA R13	.2	1024.0	45.0	-26.0
BAG,DECONTAMINATION,SRC NO. 1	06331.	111	1	AREA B5	.9	1031.0	-8.0	39.0
BAG,DECONTAMINATION,SRC NO. 2	06331.	111	1	AREA B6	.9	1031.0	13.0	39.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM POST A/S JETTISON (22)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
CONTAINGR,EVA EQUIPMENT	06358	111	1	AREA A7	2.5	1011.0	22.0	8.0
CARRIER ASSY, CONT. A9	06403.	111	1	AREA A9	NEGL	1013.0	.0	16.0
BAG,DECON,LUNAR SAMPLE	06426.	111	1	AREA A7	5.0	1011.0	22.0	8.0
BAG,DECON,ISA	06427.	111	1	AREA A2	5.0	1011.0	-22.0	8.0
TETHER,IV CREWMAN	06429.	111	1	AREA A7	.5	1011.0	22.0	8.0
BAG, DECONTAMINATION 16MM MAG.	06433.	111	1	AREA R13	.3	1024.0	45.0	-26.0
BAG, DECONTAMINATION 70MM MAG.	06435.	111	1	AREA R13	.3	1024.0	45.0	-26.0
CM EQUIP.RELOC.3					194.63	1019.68	5.18	-20.86

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO PRE CSM AT EVA (23)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	AREA A2	.3	1011.0	-22.0	8.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	AREA A2	.3	1011.0	-22.0	8.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	1	AREA A2	.3	1011.0	-22.0	8.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0
ITLSA,IV CMP	B0212.	111	1	SLEEP RESTRAINT - RT	39.9	1018.0	23.0	-50.0
GLOVES,IV PAIR	B0213.	111	1	HELMET STOW.BAG (L3)	2.0	1048.0	-47.0	12.0
GLOVES,IV PAIR	B0213.	111	1	HELMET STOW BAG (B1)	2.0	1050.0	-27.0	39.0
GLOVES,IV PAIR	B0213.	111	1	AFT UPR EQUIP.BAY-RH	2.0	1020.0	25.0	-22.0
HELMET ASSY, PRESSURE	B0214.	111	1	AFT UPR EQUIP.BAY-RH	2.6	1020.0	25.0	-22.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW BAG (B1)	2.6	1050.0	-27.0	39.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW.BAG (L3)	2.6	1048.0	-47.0	12.0
COMMUNICATION CARRIER	B0217.	111	1	GNIC PANEL	1.6	1050.0	.0	22.0
COMMUNICATION CARRIER	B0217.	111	1	GNIC PANEL	1.6	1050.0	.0	22.0

TABLE 3.1-9.2 (CONTINUED)

MISSICN J-1 TRANSFERREC CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO PRE CSM AT EVA (23)

						APCLLC CCORCINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STCWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
COMMUNICATION CARRIER	B0217.	111	1	GNIC PANEL	1.6	1050.0	.0	22.0
POCKET,SCISSORS (CMP)	B0218.	111	1	ON ICG-CMP./LH STA.	.2	1C43.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON ICG-CDR./CTR.STA.	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON ICG-LMP./RH STA.	.2	1C43.C	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON ICG-CDR./CTR.STA.	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON ICG-LMP./RH STA.	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON ICG-CDR./CTR.STA.	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON ICG-LMP./RH STA.	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON ICG-CMP./LH STA.	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	CN ICG-CMP./LH STA.	TBD	1043.C	-24.5	-10.4
HEADSET,LIGHTWEIGHT	E0111.	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
HEADSET,LIGHTWEIGHT	E0112.	111	1	CN CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
HEADSET,LIGHTWEIGHT	E0113.	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
EARTUBE,UNIVERSAL (CMP)	E0114.	111	1	CN CREW-CMP(LH STA)	NEGL	1043.0	-24.5	-10.4
EARTUBE,UNIVERSAL (CDR)	E0115.	111	1	ON CREW-CDR(CTR.STA)	NEGL	1043.0	.0	-10.4
EARTUBE,UNIVERSAL (LMP)	E0116.	111	1	CN CREW-LMP(RH STA)	NEGL	1043.0	24.5	-10.4
CM EQUIP.RELOC.4					167.23	1019.15	4.02	-22.45

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO PRE CSM AT EVA (24)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-LH STA)	.1	1043.0	-24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-RH STA)	.1	1043.0	24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA(CREW-CTR STA)	.1	1043.0	.0	-10.4
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	1	ON CREW-CMP(LH STA)	.3	1043.0	-24.5	-10.4
UCTA	B0205.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
UCTA	B0205.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
UCTA	B0205.	111	1	ON CREW-CMP(LH STA)	.5	1043.0	-24.5	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-LMP(RH STA)	45.2	1043.0	24.5	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-CDR(CTR.STA)	45.2	1043.0	.0	-10.4
ITLSA,IV CMP	B0212.	111	1	ON CREW-CMP(LH STA)	39.9	1043.0	-24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CMP(LH STA)	2.0	1043.0	-24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-LMP(RH STA)	2.0	1043.0	24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CDR(CTR.STA)	2.0	1043.0	.0	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CMP(LH STA)	2.6	1043.0	-24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-LMP(RH STA)	2.6	1043.0	24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CDR(CTR.STA)	2.6	1043.0	.0	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-CMP(LH STA)	1.6	1043.0	-24.5	-10.4
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-LMP(RH STA)	1.6	1043.0	24.5	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW ANC EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO PRE CSM AT EVA (24)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLC CCCRDINATES X-C.G.	Y-C.G.	Z-C.G.
COMMUNICATION CARRIER	B0217.	111	1	ON CREW-CDR(CTR.STA)	1.6	1043.C	.0	-10.4
POCKET,SCISSORS (CMP)	B0218.	111	1	ON PGA (CREW-LH STA)	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	CN PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON PGA(CREW-CTR STA)	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON PGA (CREW-RH STA)	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON PGA (CREW-LH STA)	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON PGA (CREW-LH STA)	TBD	1043.0	-24.5	-10.4
HEADSET,LIGHTWEIGHT	E0111.	111	1	AREA A8	.4	1011.0	21.C	-23.0
HEACSET,LIGHTWEIGHT	E0112.	111	1	AREA A8	.4	1011.C	21.0	-23.0
HEADSET,LIGHTWEIGHT	E0113.	111	1	AREA A8	.4	1011.0	21.0	-23.0
EARTUBE,UNIVERSAL (CMP)	E0114.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
EARTUBE,UNIVERSAL (CDR)	E0115.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
EARTUBE,UNIVERSAL (LMP)	E0116.	111	1	AREA U2	NEGL	1033.0	-23.0	-50.0
CM EQUIP.RELCC.4					167.23	1041.98	-.89	-13.62

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS TRANSFERRED FROM SM TO CM DURING SIM EVA (25)

						APOLLO COORDINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
MAGAZINE, 24 IN. PAN. CAMERA	P0400.	115	1	IN SIM BAY (3IN)	76.0	945.5	34.5	-52.5
MAGAZINE,3 IN.MAP CAMERA	P0401.	111	1	IN SIM BAY (24 IN)	24.0	886.0	53.0	-56.0
EQUIP.XFR. SM-CM					100.00	931.22	38.94	-53.34

TABLE 3.1-9.2 (CONTINUED)

MISSICN J-1 TRANSFERREC CREW AND EQUIPMENT STCWAGE LIST

ITEMS TRANSFERRED FROM SM TO CM DURING SIM EVA (26)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APCLLC CCCRDINATES X-C.G.	APCLLC CCCRDINATES Y-C.G.	APCLLC CCCRDINATES Z-C.G.
MAGAZINE, 24 IN. PAN. CAMERA	P0400.	115	1	AREA A2	76.0	1C11.0	-22.0	8.0
MAGAZINE,3 IN.MAP CAMERA	P0401.	111	1	BAG,RETURN EQUIP(B1)	24.0	1050.0	-27.0	39.0
EQUIP.XFR. SM-CM					100.00	1020.36	-23.20	15.44

TABLE 3.1-9.2 (CONTINUED)

MISSICN J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS OFFLOADED FROM CSM POST SIM EVA (27)

						APCLLC CCORCINATES		
DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
BAG, JETTISON STOWAGE	B0147.	111	2	AREA A2	1.8	1011.0	-22.0	8.0
ITEMS,FOOD + HYGIENE	C0100.	111	1	AREA B1	30.8	1050.0	-27.0	39.0
EVA CFFLOAD					32.60	1047.85	-26.72	37.29

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO ENTRY (28)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-LH STA)	.1	1043.0	-24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (CREW-RH STA)	.1	1043.0	24.5	-10.4
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA(CREW-CTR STA)	.1	1043.0	.0	-10.4
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
JACKET ASSY,ICG	B0112.1	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
TROUSER ASSY,ICG	B0112.2	111	1	AREA U2	1.8	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,RIGHT,ICG	B0112.3	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
BOOT,LEFT, ICG	B0112.4	111	1	AREA U2	.4	1033.0	-23.0	-50.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-LMP(RH STA)	.3	1043.0	24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	ON CREW-CDR(CTR.STA)	.3	1043.0	.0	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	1	ON CREW-CMP(LH STA)	.3	1043.0	-24.5	-10.4
PAD,HEADREST	B0130.	117	1	AREA A2	1.1	1011.0	-22.0	8.0
PAD,HEADREST	B0130.	117	1	AREA A2	1.1	1011.0	-22.0	8.0
PAD,HEADREST	B0130.	117	1	AREA A2	1.1	1011.0	-22.0	8.0
HEEL RESTRAINT,L.H. AND R.H.	B0132.	117	1	AREA A2	1.2	1011.0	-22.0	8.0
HEEL RESTRAINT,L.H. AND R.H.	B0132.	117	1	AREA A2	1.2	1011.0	-22.0	8.0
HEEL RESTRAINT,L.H. AND R.H.	B0132.	117	1	AREA A2	1.2	1011.0	-22.0	8.0
GLOVES,EV-(CMP)	B0150.	111	1	AREA A2	2.7	1011.0	-22.0	8.0
VEST,DUAL LIFE	B0202.	111	1	IN HSB (U2)	2.4	1033.0	-23.0	-50.0
VEST,DUAL LIFE	B0202.	111	1	IN HSB (U2)	2.4	1033.0	-23.0	-50.0
VEST,DUAL LIFE	B0202.	111	1	IN HSB (U2)	2.4	1033.0	-23.0	-50.0
UCTA	B0205.	111	1	ON CREW-LMP(RH STA)	.5	1043.0	24.5	-10.4
UCTA	B0205.	111	1	ON CREW-CDR(CTR.STA)	.5	1043.0	.0	-10.4
UCTA	B0205.	111	1	ON CREW-CMP(LH STA)	.5	1043.0	-24.5	-10.4
ITLSA - EV	B0211.	111	1	ON CREW-LMP(RH STA)	45.2	1043.0	24.5	-10.4

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO ENTRY (28)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES X-C.G.	Y-C.G.	Z-C.G.
ITLSA - EV	B0211.	111	1	ON CREW-CDR(CTR.STA)	45.2	1043.0	.0	-10.4
ITLSA,IV CMP	B0212.	111	1	ON CREW-CMP(LH STA)	39.9	1043.0	-24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CMP(LH STA)	2.0	1043.0	-24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-LMP(RH STA)	2.0	1043.0	24.5	-10.4
GLOVES,IV PAIR	B0213.	111	1	ON CREW-CDR(CTR.STA)	2.0	1043.0	.0	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CMP(LH STA)	2.6	1043.0	-24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-LMP(RH STA)	2.6	1043.0	24.5	-10.4
HELMET ASSY, PRESSURE	B0214.	111	1	ON CREW-CDR(CTR.STA)	2.6	1043.0	.0	-10.4
POCKET,SCISSORS (CMP)	B0218.	111	1	ON PGA (CREW-LH STA)	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON PGA(CREW-CTR STA)	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON PGA (CREW-RH STA)	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON PGA(CREW-CTR STA)	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON PGA (CREW-RH STA)	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON PGA (CREW-LH STA)	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON PGA (CREW-LH STA)	TBD	1043.0	-24.5	-10.4
CONTAINER,R12	00344.	115	1	RH GIRTH RING	2.7	1034.0	41.0	-21.0
FILTER,CABIN FAN	06395.	111	1	AREA U2	2.4	1033.0	-23.0	-50.0
RESTRAINT ASSY,SLEEP (RIGHT)	00322.	111	1	AFT UPR EQUIP.BAY	3.8	1018.0	23.0	-50.0
RESTRAINT ASSY,SLEEP (CENTER)	00324.	111	1	AFT UPR EQUIP.BAY	2.7	1018.0	23.0	-50.0
CM EQUIP.RELOC.5					189.63	1039.19	-1.82	-15.74

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO ENTRY (29)

APOLLO COORDINATES

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	X-C.G.	Y-C.G.	Z-C.G.
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
BAG,MOTION SICKNESS	A0208.	111	1	ON PGA (PGA CONT)	.1	1011.0	.0	-14.0
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
JACKET ASSY,ICG	B0112.1	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-LMP(RH STA)	1.8	1043.0	24.5	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CDR(CTR.STA)	1.8	1043.0	.0	-10.4
TROUSER ASSY,ICG	B0112.2	111	1	ON CREW-CMP(LH STA)	1.8	1043.0	-24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,RIGHT,ICG	B0112.3	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-LMP(RH STA)	.4	1043.0	24.5	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CDR(CTR.STA)	.4	1043.0	.0	-10.4
BOOT,LEFT, ICG	B0112.4	111	1	ON CREW-CMP(LH STA)	.4	1043.0	-24.5	-10.4
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	AREA A2	.3	1011.0	-22.0	8.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	*1	AREA A2	.3	1011.0	-22.0	8.0
SUBSYSTEM,FECAL CONTAINMENT	B0113.	111	1	AREA A2	.3	1011.0	-22.0	8.0
PAD,HEADREST	B0130.	117	1	ON COUCH(RH CREW STA	1.1	1043.0	24.5	-10.4
PAD,HEADREST	B0130.	117	1	ON COUCH(CTR CRW.STA	1.1	1043.0	.0	-10.4
PAD,HEADREST	B0130.	117	1	ON COUCH(LH CREW STA	1.1	1043.0	-24.5	-10.4
HEEL RESTRAINT,L.H. AND R.H.	B0132.	117	1	ON CREW-LMP(RH STA)	1.2	1043.0	24.5	-10.4
HEEL RESTRAINT,L.H. AND R.H.	B0132.	117	1	ON CREW-CDR(CTR.STA)	1.2	1043.0	.0	-10.4
HEEL RESTRAINT,L.H. AND R.H.	B0132.	117	1	ON CREW-CMP(LH STA)	1.2	1043.0	-24.5	-10.4
GLOVES,EV-(CMP)	B0150.	111	1	AFT UPR EQUIP.BAY-LH	2.7	1018.0	-21.0	-49.9
VEST,DUAL LIFE	B0202.	111	1	ON CREW-CDR(CTR.STA)	2.4	1043.0	.0	-10.4
VEST,DUAL LIFE	B0202.	111	1	ON CREW-CMP(LH STA)	2.4	1043.0	-24.5	-10.4
VEST,DUAL LIFE	B0202.	111	1	ON CREW-LMP(RH STA)	2.4	1043.0	24.5	-10.4
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
UCTA	B0205.	111	1	IN CM PGA CONTAINER	.5	1015.0	.0	-20.0
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0

TABLE 3.1-9.2 (CONTINUED)

MISSION J-1 TRANSFERRED CREW AND EQUIPMENT STOWAGE LIST

ITEMS REARRANGED IN CM PRIOR TO ENTRY (29)

DESCRIPTION	STOW. ITEM	REF	NO.	STOWAGE LOCATION	WEIGHT	APOLLO COORDINATES		
						X-C.G.	Y-C.G.	Z-C.G.
ITLSA - EV	B0211.	111	1	ITLSA IN PGA CONT.	45.2	1011.0	.0	-20.0
ITLSA,IV CMP	B0212.	111	1	ON RH+CTR SLEEP REST	39.9	1020.0	25.0	-22.0
GLOVES,IV PAIR	B0213.	111	1	HELMET STOW.BAG (L3)	2.0	1048.0	-47.0	12.0
GLOVES,IV PAIR	B0213.	111	1	HELMET STOW BAG (B1)	2.0	1050.0	-27.0	39.0
GLOVES,IV PAIR	B0213.	111	1	AFT UPR EQUIP.BAY-RH	2.0	1020.0	25.0	-22.0
HELMET ASSY, PRESSURE	B0214.	111	1	AFT UPR EQUIP.BAY-RH	2.6	1020.0	25.0	-22.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW BAG (B1)	2.6	1050.0	-27.0	39.0
HELMET ASSY, PRESSURE	B0214.	111	1	HELMET STOW.BAG (L3)	2.6	1048.0	-47.0	12.0
POCKET,SCISSORS (CMP)	B0218.	111	1	ON CREW-CMP(LH STA)	.2	1043.0	-24.5	-10.4
POCKET,SCISSORS (CDR)	B0218.	111	1	ON CREW-CDR(CTR.STA)	.2	1043.0	.0	-10.4
POCKET,SCISSORS (LMP)	B0218.	111	1	ON CREW-LMP(RH STA)	.2	1043.0	24.5	-10.4
POCKET,CHECKLIST (CDR)	B0219.	111	1	ON CREW-CDR(CTR.STA)	.2	1043.0	.0	-10.4
POCKET,CHECKLIST (LMP)	B0219.	111	1	ON CREW-LMP(RH STA)	.2	1043.0	24.5	-10.4
POCKET,DATA (CDR)	B0220.	111	1	ON CREW-CDR(CTR.STA)	TBD	1043.0	.0	-10.4
POCKET,DATA (LMP)	B0220.	111	1	ON CREW-LMP(RH STA)	TBD	1043.0	24.5	-10.4
POCKET,CHECKLIST (CMP)	B0221.	111	1	ON CREW-CMP(LH STA)	.2	1043.0	-24.5	-10.4
POCKET,DATA (CMP)	B0222.	111	1	ON CREW-CDR(CTR.STA)	TBD	1043.0	.0	-10.4
CONTAINER,R12	00344.	115	1	AREA R3	2.7	1072.0	26.0	9.0
FILTER,CABIN FAN	06395.	111	1	AREA A1	2.4	1011.0	-21.0	-22.0
RESTRAINT ASSY,SLEEP (RIGHT)	00322.	111	1	ON TOP OF AREA A8	3.8	1020.0	25.0	-8.0
RESTRAINT ASSY,SLEEP (CENTER)	00324.	111	1	ON TOP OF AREA A8	2.7	1020.0	25.0	-8.0
CM EQUIP.RELOC.5					189.63	1021.08	4.63	-16.30

TABLE 3.1-10

CONSUMABLES LOADING REQUIREMENTS AND TOLERANCES

MISSION J-1

SPS PROPELLANT

Pressure (PSIA)		Temperature (°F)		Quantity Readout (%)	
Fuel	Oxidizer	Fuel	Oxidizer	Fuel	Oxidizer
110±4	110±4	70±5	70±5	See Figure 4.1-3	See Figure 4.1-4

SPS Propellant Load (lb)	Loading Requirement		Actual	
	Fuel	Oxidizer	Fuel	Oxidizer
[1]Load	15704.0	25092.0		
[2]Trapped Outside Tanks	78.6	123.7		
Tanked	15625.4	24968.3		
[2]Trapped Inside Tanks	67.6	171.5		
[3]Nominal Deliverable	15557.8	24796.8		

[4]Service Module RCS Propellant

Secondary Fuel - Quads A, B, C, D - See Loading Window - Figure 4.3-1.

Primary Fuel - Quads A, B, C, D - See Loading Window - Figure 4.3-2.

Primary and Secondary Oxidizer - Quads A, B, C, D - See Loading Window - Figure 4.3-3.

[5]Command Module RCS Propellant

Fuel - System A and B - See Loading Window - Figure 4.3-4.

Oxidizer - System A and B - See Loading Window - Figure 4.3-5.

[9]Helium and Nitrogen

Consumable	Loading Requirement				Actual	
	Pressure (PSIA)	Temp (°F)	Weight (lb)	Earth Launch Weight (lb)	Pressure (PSIA)	Temp (°F)
Helium - SPS Bottles	3600	70	87.6	87.6		
Helium - Fuel Tanks	178	70	5.4			
Helium - N_2O_4 Tanks	178	70				
Helium - SM/RCS						
Quads A	4150	70	6.0	6.0		
Quads B	4150	70				
Quads C	4150	70				
Quads D	4150	70				
Helium - CM/RCS						
System A	4150	70	1.0	1.0		
System B	4150	70				
Nitrogen - SM						
Primary	2500	85	1.3	1.3		
Secondary	2500	85				

TABLE 3.1-10 (CONTINUED)

Command Module Water and GOX

	Pressure (PSIA)	Loading Requirement Weight (lb)	Earth Launch Weight (lb)	Actual
Waste Water[6]			18.0	
Potable Water[7]			36.0	
CM/GOX	900±50	3.7	6.7 (Entry)	

[8]**Service Module Hydrogen and Oxygen**

	Loading Req. Per Tank (pounds)	Earth Launch Weight Per Tank (lb)
Hydrogen		
Tank 1	29.3	27.6
Tank 2	29.3	27.6
Tank 3	29.3	27.6
Oxygen		
Tank 1	330.1	316.6
Tank 2	330.1	316.6
Tank 3	330.1	316.6

NOTES:

[1] Indicated propellant load is based on nominal pressure and temperature prior to actual loading. This number will be updated after loading is accomplished.

[2] See Section 4.1 for explanation of trapped SPS propellant.

[3] See Table 3.1-13 for loading uncertainties.

[4] See Section 4.2 for SM/RCS loads and uncertainties to be used in Mission Planning. Actual SM/RCS loads and uncertainties will be published in Table 3.1-15.

[5] See Section 4.2 for CM/RCS loads and uncertainties to be used in Mission Planning. Actual CM/RCS loads and uncertainties will be published in Table 3.1-14.

[6] Launch Rule Redlines determine lift-off values.

[7] Launch Rule Redlines determine lift-off values.

[8] Launch Mission Rules will determine minimum lift-off quantities for H_2 and O_2.

[9] CSM helium and nitrogen should be loaded in accordance with loading windows contained in CSM/LM Spacecraft Operational Data Book, Volume I, Part 2, SNA-8-D-027(1) P2.

TABLE 3.1-11

SPS PROPELLANT LOAD CALCULATION

		FUEL	**OXIDIZER**
1.	**Enter SPS Quantity Readout at 110 PSIA (Table 3.1-12 item C - Percent)**	______	______
2.	**Use Figures 4.1-3 and 4.1-4 to obtain propellant load for above quantity readout.**	______	______
3.	**Nominal propellant density at loading temperature (use temperature - density graph below) (lb/ft^3)**	______	______
4.	**Cubic feet of propellant (item 2 divided by item 3)**	______	______
5.	**Calculated density from Table 3.1-12 item f (lb/ft^3)**	______	______
6.	**Adjustment due to PUGS zero adjust (pounds)**	______	______
7.	**Resulting actual propellant load (item 4 times item 5, less item 6) (pounds)**	______	______

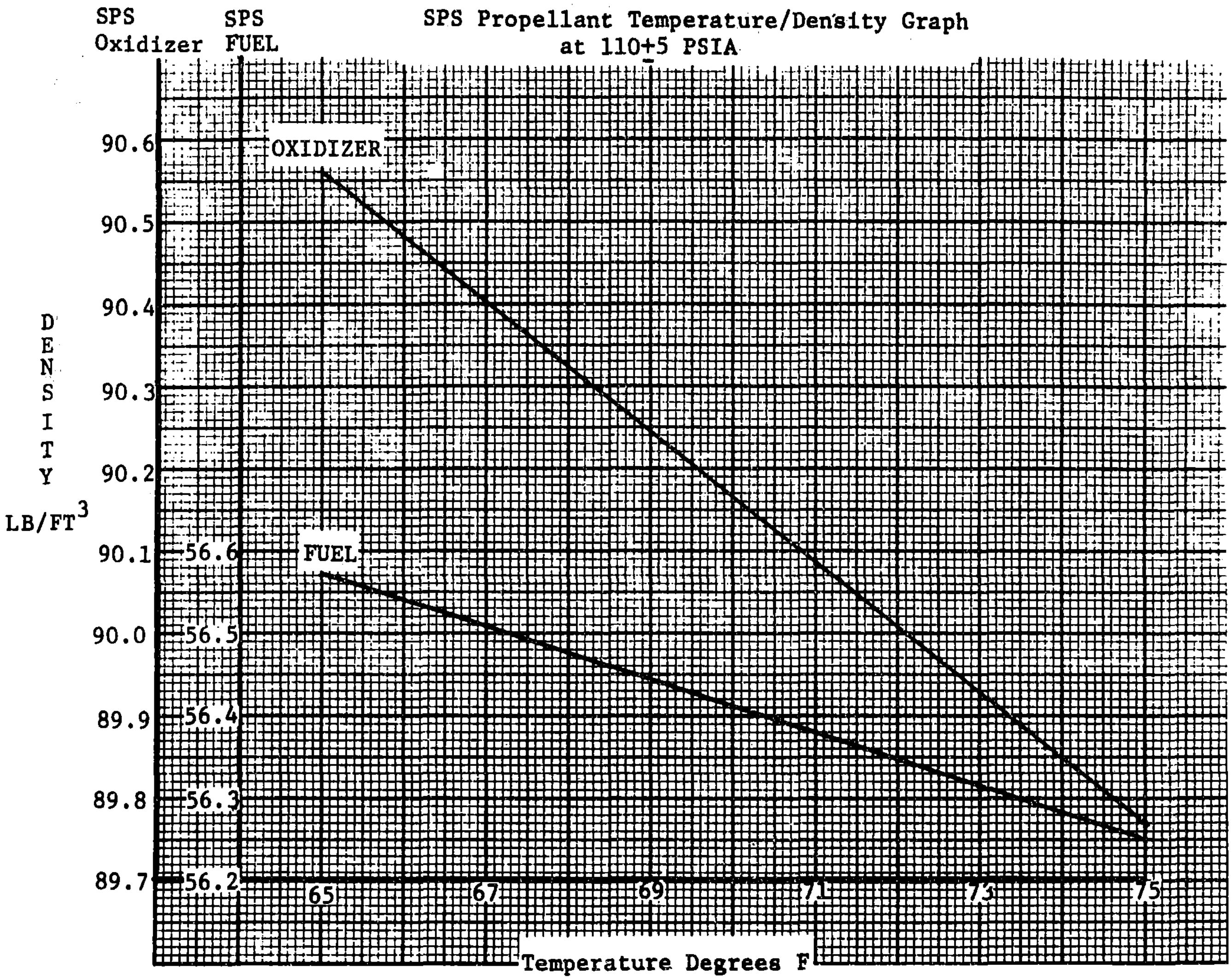

SPS Propellant Temperature/Density Graph at 110±5 PSIA

TABLE 3.1-12

MISSION J-1 SPS PROPELLANT LOAD PARAMETERS
(To be provided by KSC following loading)

Enter the following information at zero adjust - time ____

Fuel		Oxidizer	
Adjusted quantity fuel readout - Percent	____	Adjusted quantity oxidizer readout - Percent	____
Fuel storage voltage reading taken from		Oxidizer storage voltage reading taken from	
ACE to three significant digits - volts	____	ACE to three significant digits - volts	____
Fuel sump voltage reading taken from		Oxidizer sump voltage reading taken from	
ACE to three significant digits - volts	____	ACE to three significant digits - volts	____

Enter the following information at Sump Tank Full Adjust
(Propellant at top of standpipe)

Fuel		Oxidizer	
Fuel sump tank pressure - PSIA	____	Oxidizer sump tank pressure - PSIA	____
Fuel temperature - °F	____	Oxidizer temperature - °F	____
Adjusted quantity fuel readout - Percent	____	Adjusted quantity oxidizer readout - %	____
Fuel sump voltage reading taken from		Oxidizer sump voltage reading taken from	
ACE to three significant digits - volts	____	ACE to three significant digits - volts	____

Enter the following information at Storage Tank Full Adjust
(Propellant at Point Sensor #1)

Fuel		Oxidizer	
Fuel storage tank pressure - PSIA	____	Oxidizer storage tank pressure - PSIA	____
Fuel temperature - °F	____	Oxidizer temperature - °F	____
Adjusted quantity fuel readout - %	____	Adjusted quantity oxidizer readout - %	____
Fuel storage voltage reading taken from		Oxidizer storage voltage reading taken from	
ACE to three significant digits - volts	____	ACE to three significant digits - volts	____
Fuel sump voltage reading taken from		Oxidizer sump voltage reading taken from	
ACE to three significant digits - volts	____	ACE to three significant digits - volts	____

TABLE 3.1-12 (CONTINUED)

MISSION J-1 SPS PROPELLANT LOAD PARAMETERS

(To be provided by KSC following loading)

Enter the following information when tanking is complete (110±5 PSIA) Time

Fuel		Oxidizer	
a. System pressure - PSIA		a. System pressure - PSIA	
b. Fuel temperature - °F		b. Oxidizer temperature - °F	
c. Quantity fuel readout - %		c. Quantity oxidizer readout - %	
d. Fuel measured specific gravity @ °C - 14.7 PSIA		d. Oxidizer measured specific gravity @ °C - 14.7 PSIA	
e. Fuel measured density °C - 14.7 PSIA (Item d times 62.428) - lb/ft^3		e. Oxidizer measured density @ °C - 14.7 PSIA (Item d times 62.428) - lb/ft^3	
f. Calculated density - lb/ft^3 - at system pressure and temperature Items a and b above. Use density equation outlined in Section 4.1.		f. Calculated density - lb/ft^3 - at system pressure and temperature, Item a and b above. Use density equation outlined in Section 4.1.	
g. Fuel storage voltage reading from ACE		g. Oxidizer storage voltage reading from ACE	
h. Fuel sump voltage reading from ACE		h. Oxidizer sump voltage reading from ACE	

Enter the following information at leak check pressure

Fuel		Oxidizer	
System pressure - PSIA		System pressure - PSIA	
Quantity fuel readout - %		Quantity oxidizer readout - %	
Fuel storage voltage reading from ACE		Oxidizer storage voltage readout from ACE	
Fuel sump voltage reading from ACE		Oxidizer sump voltage readout from ACE	

TABLE 3.1-13

SPS PROPELLANT UNCERTAINTIES

ITEM	FUEL (lb)	OXIDIZER (lb)
LOADING UNCERTAINTIES		
Tank Volume	±24	±39
Temperature Gauge (±2.0°F)	±18	±46
Standpipe Height	± 6	±10
Propellant Gauge (±0.35% of Gaugeable)	±54	±86
Density Measurement (1)	± 0	± 0
Batch Density (1)	±94	±75
Loading Pressure (1)	± 8	±14
RSS	±113	±130
TOTAL RSS	±172	
Loading Specification (1) (2)	±16	±24
Tolerance on Propellant Temperature of Flight Load	+0.0 -46.0	+0.0 -113.0
TOTAL LOADING UNCERTAINITY	+212 -371	

NOTES: (1) Data will be known after loading is accomplished.

(2) Loading specification is an allowable tolerance about nominal, this number is added to the loading uncertainity variable.

TABLE 3.1-14

COMMAND MODULE RCS LOADING PARAMETERS AND CALCULATIONS

This table will be completed when loading is accomplished. For Mission Planning, reference should be made to Section 4.2 for nominal load, loading tolerances, trapped and deliverable propellants.

	FUEL		**OXIDIZER**	
	Tank A	**Tank B**	**Tank A**	**Tank B**
A. Tank Volume @0.0 PSIA (in^3)	______	______	______	______
B. Liquid Line Volume (in^3)	______	______	______	______
C. Total A + B (in^3)	______	______	______	______
D. Initial Weight in Bleed Unit Prior to Loading (lb)	______	______	______	______
E. Final Weight in Bleed Unit After Loading (lb)	______	______	______	______
F. Propellant Load (item D less than E Weigh Tank)	______	______	______	______
G. Propellant Load by P.V.	______	______	______	______
H. Loading Temperature (°F)	______	______	______	______
I. Specification Propellant Load @ 70±5°F (lb)	______		______	
J. Total CM/RCS Propellant Load from Item G above (lb)	______		______	
K. Maximum Trapped Propellant (lb)	______		______	
L. Nominal Deliverable (lb)	______		______	

TABLE 3.1-15

SERVICE MODULE RCS LOADING SUMMATION

This table will be completed when loading is accomplished. For Mission Planning, reference should be made to Section 4.2, for nominal load, loading tolerances, and nominal deliverable propellants.

Quad A (lb)			Quad B (lb)		
Secondary Fuel			Secondary Fuel		
Primary Fuel			Primary Fuel		
Total Fuel		±0.7	Total Fuel		±0.7
Maximum Trapped	2.1		Maximum Trapped	2.1	
Nominal Deliverable			Nominal Deliverable		
Total Oxidizer		±2.3	Total Oxidizer		±2.3
Maximum Trapped	4.5		Maximum Trapped	4.5	
Nominal Deliverable			Nominal Deliverable		

Quad C (lb)			Quad D (lb)		
Secondary Fuel			Secondary Fuel		
Primary Fuel			Primary Fuel		
Total Fuel		±0.7	Total Fuel		±0.7
Maximum Trapped	2.1		Maximum Trapped	2.1	
Nominal Deliverable			Nominal Deliverable		
Total Oxidizer		±2.3	Total Oxidizer		±2.3
Maximum Trapped	4.5		Maximum Trapped	4.5	
Nominal Deliverable			Nominal Deliverable		

Total SM/RCS Propellant Load (lb)

Total Fuel		±1.4	Total Oxidizer		±4.6
Maximum Trapped	8.4		Maximum Trapped	18.0	
Nominal Deliverable			Nominal Deliverable		

TABLE 3.1-16

LM-10 CONSUMABLE LOADING REQUIREMENTS

LM-10 APS PROPELLANT

	Fuel (lb)	Oxidizer (lb)
Propellant Load	2017.2	3225.7
Trapped Outside Tanks	5.9	8.3
Tanked	2011.3	3217.4
Trapped Inside Tanks	10.1	27.6
Nominal Deliverable	2001.2	3189.8
Outage	TBD	TBD
Total APS Propellant	TBD	

The following table should be used to determine the amount of propellant to be off-loaded from a full condition to arrive at the indicated load. The allowable tolerance for the calculated off-load is ±0.5 pounds per weigh tank.

A.	Final tank pressure at overfill (PSIG)		
B.	Propellant loading temperature (°F)		
C.	Nominal overfill quantity (lb)	TBD	TBD
D.	Correction for tank pressure (lb)		
	Fuel = 0.09 (Item A-40)		
	Oxidizer = 0.15 (Item A-40)		
[1]E.	Correction for loading temperature (lb)		
	Fuel = 1.16 (Item B-65)		
	Oxidizer = -2.84 (Item B-65)		
[2]F.	Measured density (GM/CC)		
[2]G.	Nominal density (GM/CC)	0.8994	1.4824
H.	Delta density (GM/CC) (Item F-G)		
[3]I.	Correction for measured density		
	Fuel = 2300 (Item H)		
	Oxidizer = 2300 (Item H)		
J.	Propellant in GSE		
K.	Overfill quantity (C+D+E+I+J)		
L.	Target loading	2017.2	3225.7
M.	Quantity required to fill RCS manifolds	10.0	15.8
N.	Quantity to be off-loaded (Item K-L-M)		

NOTES:

[1] Loading temperature correction will always be negative.

[2] To calculate the nominal density solve the following equation where T = temperature in °C of the measured density (usually 4°C for oxidizer and 25°C for fuel). This equation is valid for 14.7 PSIA. Therefore, the measured density must also be at 14.7 PSIA.

Nominal fuel density = 0.922904-0.0009377 (°C)
Nominal oxidizer density = 1.491539-0.0022832 (°C)

[3] Correction for measured density may be either positive or negative.

TABLE 3.1-16 (CONTINUED)

LM-10 CONSUMABLE LOADING REQUIREMENTS

LM-10 DPS PROPELLANT

	Fuel (lb)	Oxidizer (lb)
Propellant Load	7541.1	12042.1
Trapped Outside Tanks	27.7	49.2
Tanked	7513.4	11992.9
Trapped Inside Tanks	21.9	39.6
Nominal Deliverable	7491.5	11953.3
Outage	TBD	TBD
Total DPS Propellant	TBD	

The following table should be used to determine the amount of propellant to be off-loaded from a full condition to arrive at the indicated load. The allowable tolerance for the calculated off-load is ±0.5 pounds per weigh tank.

A1.	Final tank pressure at overfill (PSIG)		
B1.	Propellant loading temperature (°F)		
C1.	Nominal overfill quantity (lb)	TBD	TBD
D1.	Correction for tank pressure (lb) Fuel = TBD Oxidizer = TBD		
[1]E1.	Correction for loading temperature (lb) Fuel = TBD Oxidizer = TBD		
[2]F1.	Measured density (GM/CC)		
[2]G1.	Nominal density (GM/CC)	0.8994	1.4824
H1.	Delta density (GM/CC) (Item F1-Item G1)		
[3]I1.	Correction for measured density Fuel = TBD Oxidizer = TBD		
J1.	Propellant in GSE		
K1.	Overfill quantity (C1+D1+E1+I1+J1)		
L1.	Target loading	7541.1	12042.1
M1.	Quantity required to fill RCS manifolds (APS only)	xxxxxxx	xxxxxxx
N1.	Quantity to be off-loaded (Items K1-L1-M1)		

NOTES:

[1] Loading temperature correction will always be negative.

[2] To calculate the nominal density solve the following equation where T = temperature in °C of the measured density (usually 4°C for oxidizer and 25°C for fuel). This equation is valid for 14.7 PSIA. Therefore, the measured density must also be at 14.7 PSIA.

Nominal fuel density = 0.922904-0.0009377 (°C)

Nominal oxidizer density = 1.491539-0.0022832 (°C)

[3] Correction for measured density may be either positive or negative.

TABLE 3.1-16 (CONTINUED)

LM-10 - RCS PROPELLANT (2) (3)

	Required Load (lb)[5]	Ullage Requirement (in^3) Minimum[4]	Ullage Requirement (in^3) Maximum[4]	[1]Actual[5] Load (lb)	[1]Actual[4] Ullage (in^3)
System A Fuel	107.4±0.9	152.5	164.5		
System A Oxidizer	208.2±1.9	267.0	279.0		
System B Fuel	107.4±0.9	152.5	164.5		
System B Oxidizer	208.2±1.9	267.0	279.0		

	FUEL	OXIDIZER
Propellant Load	214.8	416.4
Trapped Outside Tanks	10.5	15.8
Tanked	204.3	400.6
Trapped in Tanks	4.2	8.0
Nominal Deliverable	200.1	392.6

LM-10 - Helium & Nitrogen

Consumable	Nominal Loading Requirement Pressure (PSIA)	Temp (°F)	Weight (lb)	Actual Pressure (PSIA)	Temp (°F)	Weight (lb)
Helium - APS tank #1 (6)	3050	70	6.6			
- APS tank #2 (6)	3050	70	6.6			
- RCS tank #1 (6)	3050	70	1.05			
- RCS tank #2 (6)	3050	70	1.05			
- DPS (SHe)	80±2	N/A	48.5			
- DPS (Ambient)(6)	1600	70	1.1			
Nitrogen - Ascent			0.1			
- Descent			0.6			

LM-10 - Water & GOX

Consumable	Nominal Loading Requirement Pressure (PSIA)	Weight (lb)	Actual Pressure (PSIA)	Weight (lb)
Ascent Water - tank #1	N/A	42.5	N/A	
- tank #2	N/A	42.5	N/A	
Descent Water - tank #1	N/A	(7)	N/A	
- tank #2	N/A	(7)	N/A	
Ascent GOX - tank #1 (6)	830	2.4		
- tank #2 (6)	830	2.4		
Descent GOX - tank #1 (6)	2700	48.0		
- tank #2 (6)	2700	48.0		

NOTES:

[1] See Table 3.1-17 for actual propellant load calculation.

[2] See Section 5.6 for explanation of trapped propellants.

[3] See Table 3.1-18 for loading uncertainties.

[4] PV ullage calculation should be 166.5±50 cubic inches for LM/RCS fuel and 280±50 cubic inches for LM/RCS oxidizer per tank.

[5] LM/RCS required load includes propellant required to fill RCS manifolds to isolation valves. See Table 3.1-16. See Section 5.6 for trapped propellants.

[6] The indicated items should be loaded in accordance with loading windows contained in the CSM/LM Spacecraft Operational Data Book, Volume II, Part 2, SNA-8-D-027PT2.

[7] LM-10 Descent Water shall be loaded to provide 390-0.0+10.0 pounds at Earth Launch. Initial load will be determined by sampling requirements.

TABLE 3.1-17

LOAD CALCULATION

	APS PROPELLANT	Fuel	Oxidizer
1.	Full tank - Item K, Table 3.1-16 (lb)		
[1]2.	Density of off-load tables at loading temperature and pressure (lb/ft^3)		
[1]3.	Propellant volume (divide item 1 by item 2. (ft^3)		
[1]4.	Measured density (from Table 3.1-19) (lb/ft^3)		
5.	Resulting full tank load (lb)		
6.	Off-load amount (lb)		
7.	Propellant required to fill RCS manifolds (lb)		
8.	Propellant load (lb)		
	DPS PROPELLANT		
9.	Full tank - Item K1 Table 3.1-16		
[1]10.	Density of off-load tables at loading temperature and pressure (lb/ft^3)		
[1]11.	Propellant volume (divide Item 9 by Item 10)(ft^3)		
[1]12.	Measured density (from Table 3.1-19) (lb/ft^3)		
13.	Resulting full tank load (lb)		
14.	Off-load amount (lb)		
15.	Propellant load (lb)		

RCS PROPELLANT

P. V. Calculations		Fuel		Oxidizer	
		Tank A	Tank B	Tank A	Tank B
A.	GSE Volume (in^3)				
B.	Initial Ullage Pressure (PSIG)				
C.	Initial GSE Pressure (PSIG)				
D.	Final GSE - S/C Pressure (PSIG)				
E.	Ullage Volume (in^3) - Solve the following equation by substituting the values in the indicated steps.				

Ullage Volume = $\frac{(D-C)\ (A)}{B-D}$

NOTE: [1]These items will be completed only if a density sample is not made prior to loading. If a density sample is made prior to loading, then the items will be left blank.

TABLE 3.1-18

LM-10 PROPELLANT LOADING UNCERTAINTIES

LM-10 APS PROPELLANT

	Fuel (lb)	Oxidizer (lb)
Vent Line Volume	±0.2	±0.3
Tank Volume	±0.8	±1.3
Pressure Measurement (±5 PSIA)	±0.5	±0.8
Temperature Measurement (±1.5°F)	±1.7	±4.3
Measured Density	±0.7	±0.5
Weight Measurement	±0.5	±0.5
[1] Loading Tolerance	±0.5	±0.5
Total Loading Uncertainity	±4.8	±8.2

LM-10 DPS PROPELLANT

	Fuel (lb)	Oxidizer (lb)
Vent Line Volume	±0.2	±0.3
Tank Volume	±3.62	±5.96
Pressure Measurement (±5 PSIA)	±1.70	±2.77
Temperature Measurement (1.5°F)	±6.49	±15.76
Measured Density	±2.55	±1.70
Weight Measurement	±0.5	±0.5
[1] Loading Tolerance	±0.5	±0.5
Total Loading Uncertainity	±15.6	±27.5

LM-10 RCS PROPELLANT

	Fuel (lb)	Oxidizer (lb)
Loading Temperature	±0.6	±1.8
Ullage Calculation	±0.4	±0.6
Tank and Manifold Volume	±0.8	±1.4
Total	±1.8	±3.8

[1] These will be known quantities after loading is accomplished.

TABLE 3.1-19

LM-10 APS PROEPLLANT LOADING PARAMETERS
(To Be Completed by KSC at Loading)

	Fuel	Oxidizer
Loading Pressure - PSIA		
Loading Temperature - Fill Line - Degrees F: TT 58 Fuel TT258 Oxidizer		
Loading Temperature - Return Line - Degrees F: TT 59 Fuel TT259 Oxidizer		
Loading Temperature - Tank - Degrees F: GP0718 Fuel GP1218 Oxidizer		
Number of Times Weigh Tank Used (Flow Meter Not Used)		
Total Pounds Off-Loaded Using Weigh Tank (Flow Meter Not Used)		
Pounds Off-Loaded Using Flow Meter (Weigh Tank Not Used)		
Measured Fuel Density @ °C; @ PSIA GM/CC		
Measured Oxidizer Density @ °C; @ PSIA GM/CC		

TABLE 3.1-19 (CONTINUED)

LM-10 DPS PROPELLANT LOADING PARAMETERS

	Fuel	Oxidizer
Loading Pressure - PSIA		
Loading Temperature - Fill Line - Degrees F TT 58 Fuel TT258 Oxidizer		
Loading Temperature - Return Line - Degrees F TT 59 Fuel TT259 Oxidizer		
Loading Temperature - Tank One - Degrees F GQ3718 Fuel GQ4218 Oxidizer		
Loading Temperature - Tank Two - Degrees F GQ3719 Fuel GQ4219 Oxidizer		
Number of Times Weigh Tank Used (Flow Meter Not Used)		
Total Pounds Off-Loaded Using Weigh Tank (Flow Meter Not Used)		
Pounds Off-Loaded Using Flow Meter (Weigh Tank Not Used)		
Measured Fuel Density @ °C; @ PSIA GM/CC		
Measured Oxidizer Density @ °C; @ PSIA GM/CC		

MISSION J-1 MASS PROPERTY DATA TABLES

Table 3.1-20 **presents the CSM-112/LM-10(docked) mass properties, in Apollo coordinates, as a function of spacecraft weight for L.O.I. SM/SPS burn.**

Table 3.1-21 **presents the CSM-112/LM-10 (docked) mass properties, in Apollo coordinates, as a function of spacecraft weight for the D.O.I. SM/SPS burn.**

Table 3.1-22 **presents the CSM-112 mass properties, in Apollo coordinates, as a function of CSM weight for the Circularization I SM/SPS burn.**

Table 3.1-23 **presents the CSM-112 mass properties, in Apollo coordinates, as a function of CSM weight for the Plane Change I SM/SPS burn.**

Table 3.1-24 **presents the CSM-112 mass properties, in Apollo coordinates, as a function of CSM weight for the T.E.I. SM/SPS burn.**

Table 3.1-25 **presents the** LM-10 **mass properties, in LM coordinates, as a function of LM weight for the P.D.I. DPS burn.**

Table 3.1-26 **presents the** LM-10 **ascent stage mass properties, in LM coordinates, as a function of weight for the lunar liftoff APS burn.**

Table 3.1-27 **presents the** LM-10 **mass properties, in LM coordinates, as a function of LM weight for the** T.P.I. **to docking LM/RCS burn.**

X(A)COORDINATES TABLE 3.1-20 CSM-112/ LM-10 L.O.I. BURN

WEIGHT	X-BAR	Y-BAR	Z-BAR	IXX	IYY	IZZ	PXY	PXZ	PYZ	PITCH	YAW	AVERAGE	INERTIA/THRUST
LBS.		INCHES				SLUG-FT SQ				DEGREES		MOMENT	RATIO
102718.8	1041.18	2.94	3.52	61633	573550	576257	-10811	-6037	2036	1.181	-.140	574903	1.570
101718.8	1041.93	2.94	3.45	61109	571836	574977	-10803	-5912	1891	1.204	-.144	573407	1.560
100718.8	1042.77	2.93	3.37	60584	569826	573402	-10795	-5773	1746	1.228	-.148	571614	1.549
99718.8	1043.70	2.93	3.29	60060	567493	571504	-10785	-5618	1600	1.253	-.153	569498	1.536
98718.8	1044.72	2.92	3.22	59535	564806	569252	-10774	-5448	1455	1.279	-.158	567029	1.522
97718.8	1045.84	2.92	3.14	59010	561734	566616	-10762	-5262	1309	1.305	-.164	564175	1.506
96718.8	1047.06	2.91	3.06	58484	558245	563562	-10750	-5059	1164	1.331	-.170	560904	1.489
95718.8	1048.38	2.91	2.97	57959	554302	560055	-10736	-4840	1018	1.358	-.176	557179	1.470
94718.8	1049.81	2.90	2.89	57433	549869	556058	-10721	-4602	873	1.386	-.182	552964	1.450
93718.8	1051.34	2.90	2.80	56907	544905	551531	-10705	-4347	727	1.414	-.189	548218	1.427
92718.8	1052.99	2.89	2.71	56380	539368	546431	-10688	-4073	582	1.443	-.196	542899	1.403
91718.8	1054.75	2.89	2.62	55853	533213	540713	-10669	-3780	436	1.472	-.204	536963	1.376
90718.8	1056.63	2.88	2.53	55326	526393	534331	-10650	-3467	291	1.501	-.212	530362	1.348
89718.8	1058.64	2.87	2.44	54798	518859	527234	-10629	-3133	145	1.531	-.220	523046	1.317
88718.8	1060.78	2.87	2.34	54271	510555	519369	-10606	-2778	0	1.561	-.228	514962	1.285
87718.8	1063.05	2.86	2.24	53742	501424	510677	-10582	-2400	-145	1.591	-.237	506051	1.250
86718.8	1065.45	2.86	2.14	53214	491467	501159	-10558	-2001	-291	1.622	-.246	496313	1.213
85718.8	1068.00	2.85	2.04	52685	480502	490633	-10531	-1577	-436	1.653	-.255	485567	1.174
84718.8	1069.94	2.79	1.99	52169	473376	483508	-10432	-1389	-543	1.667	-.274	478442	1.147
83718.8	1071.15	2.69	2.00	51668	471199	480849	-10251	-1399	-608	1.669	-.302	476024	1.136
82718.8	1072.47	2.59	2.01	51167	468617	477784	-10052	-1411	-672	1.670	-.330	473200	1.123
81718.8	1073.90	2.49	2.01	50665	465639	474321	-9836	-1424	-736	1.671	-.358	469980	1.109
80718.8	1075.43	2.38	2.02	50163	462264	470462	-9603	-1437	-801	1.673	-.387	466363	1.093
79718.8	1077.08	2.27	2.02	49660	458487	466201	-9353	-1452	-865	1.675	-.417	462344	1.076
78718.8	1078.84	2.16	2.03	49158	454291	461520	-9085	-1467	-929	1.677	-.447	457905	1.058
77718.8	1080.72	2.04	2.04	48654	449654	456397	-8801	-1483	-993	1.679	-.477	453025	1.039
76718.8	1082.72	1.92	2.04	48150	444543	450801	-8498	-1501	-1057	1.681	-.508	447672	1.019
75718.8	1084.84	1.80	2.05	47646	438923	444694	-8177	-1520	-1121	1.683	-.536	441809	.997
74718.8	1087.09	1.68	2.06	47141	432750	438034	-7835	-1539	-1185	1.686	-.571	435392	.974
73718.8	1089.49	1.55	2.06	46636	425975	430771	-7473	-1560	-1250	1.688	-.603	428373	.949
72718.8	1092.02	1.42	2.07	46130	418545	422854	-7088	-1583	-1314	1.691	-.636	420700	.923
71718.8	1094.72	1.28	2.08	45624	410406	414227	-6679	-1606	-1378	1.694	-.669	412316	.895
70718.8	1097.57	1.15	2.09	45117	401502	404833	-6246	-1631	-1441	1.698	-.702	403168	.866
69718.8	1100.60	1.00	2.10	44609	391777	394619	-5786	-1658	-1505	1.701	-.735	393198	.835
68718.8	1103.80	.86	2.10	44101	381178	383529	-5300	-1686	-1569	1.704	-.769	382354	.802
67718.8	1107.19	.70	2.11	43592	369658	371518	-4785	-1719	-1633	1.708	-.803	370588	.768
66718.8	1110.77	.55	2.12	43082	357177	358546	-4240	-1746	-1697	1.712	-.837	357861	.732

X(A)COORDINATES TABLE 3.1-20(CONTINUED) CSM-112/ LM-10 L.O.I. BURN

WEIGHT LBS.	X-BAR	Y-BAR INCHES	Z-BAR	IXX	IYY	IZZ	PXY	PXZ	PYZ	PITCH	YAW	AVERAGE MOMENT	INERTIA/THRUST RATIO
						SLUG-FT SQ				DEGREES			
65718.8	1114.55	.39	2.13	42572	343658	344534	-3671	-1780	-1761	1.716	-.871	344096	.694
64718.8	1118.54	.22	2.14	42061	329029	329413	-3061	-1814	-1824	1.720	-.905	329221	.655
63718.8	1122.76	.05	2.15	41549	313219	313109	-2420	-1851	-1888	1.724	-.940	313164	.614
62718.8	1127.23	-.13	2.16	41036	295955	295350	-1739	-1890	-1952	1.729	-.974	295653	.571

X(A)COORDINATES TABLE 3.1-21 CSM-112/ LM-10 D.O.I. BURN

WEIGHT	X-BAR	Y-BAR	Z-BAR	IXX	IYY	IZZ	PXY	PXZ	PYZ	PITCH	YAW	AVERAGE MOMENT	INERTIA/THRUST RATIO
LBS.		INCHES				SLUG-FT SQ				DEGREES			
102665.9	1041.24	2.94	3.52	61586	573392	576106	-10813	-6041	2048	1.180	-.140	574749	1.569
101665.9	1041.98	2.94	3.45	61061	571677	574825	-10805	-5917	1903	1.204	-.144	573251	1.559
100665.9	1042.82	2.93	3.37	60537	569665	573248	-10796	-5777	1757	1.228	-.148	571457	1.548
99665.9	1043.75	2.93	3.30	60013	567329	571347	-10787	-5623	1612	1.253	-.153	569338	1.535
98665.9	1044.78	2.92	3.22	59488	564640	569093	-10776	-5452	1467	1.278	-.158	566867	1.521
97665.9	1045.90	2.92	3.14	58963	561566	566454	-10764	-5266	1321	1.304	-.164	564010	1.506
96665.9	1047.12	2.91	3.06	58437	558073	563398	-10751	-5063	1176	1.331	-.170	560735	1.488
95665.9	1048.44	2.91	2.98	57912	554127	559887	-10738	-4844	1030	1.358	-.176	557007	1.469
94665.9	1049.87	2.90	2.89	57386	549690	555887	-10723	-4607	885	1.386	-.182	552788	1.449
93665.9	1051.40	2.90	2.80	56860	544722	551355	-10707	-4351	739	1.414	-.189	548039	1.426
92665.9	1053.05	2.89	2.72	56333	539181	546251	-10690	-4078	594	1.442	-.196	542716	1.402
91665.9	1054.82	2.89	2.63	55806	533021	540529	-10671	-3784	448	1.471	-.204	536775	1.375
90665.9	1056.70	2.88	2.53	55279	526197	534141	-10652	-3471	303	1.501	-.212	530169	1.347
89665.9	1058.71	2.87	2.44	54751	518656	527039	-10631	-3137	157	1.530	-.220	522848	1.316
88665.9	1060.85	2.87	2.34	54224	510347	519168	-10608	-2782	11	1.560	-.228	514757	1.284
87665.9	1063.12	2.86	2.24	53695	501209	510469	-10584	-2404	-133	1.591	-.237	505839	1.249
86665.9	1065.53	2.86	2.14	53167	491246	500944	-10560	-2005	-279	1.622	-.246	496095	1.212
85665.9	1068.08	2.85	2.04	52638	480273	490410	-10533	-1580	-424	1.652	-.255	485341	1.173
84665.9	1070.03	2.79	2.00	52122	473140	483280	-10434	-1393	-532	1.667	-.274	478210	1.147
83665.9	1071.23	2.69	2.00	51621	470961	480617	-10253	-1404	-596	1.668	-.302	475789	1.135
82665.9	1072.55	2.59	2.01	51120	468374	477548	-10054	-1415	-660	1.669	-.330	472961	1.122
81665.9	1073.98	2.49	2.01	50618	465391	474081	-9837	-1428	-724	1.671	-.358	469736	1.108
80665.9	1075.53	2.38	2.02	50116	462012	470217	-9604	-1441	-789	1.672	-.387	466115	1.092
79665.9	1077.18	2.27	2.03	49613	458229	465950	-9354	-1456	-853	1.674	-.417	462090	1.075
78665.9	1078.94	2.16	2.03	49111	454028	461264	-9086	-1471	-917	1.676	-.447	457646	1.057
77665.9	1080.82	2.04	2.04	48607	449384	456134	-8802	-1488	-981	1.678	-.477	452759	1.038
76665.9	1082.82	1.93	2.05	48103	444267	450532	-8499	-1506	-1045	1.680	-.508	447400	1.018
75665.9	1084.94	1.80	2.05	47599	438640	444418	-8177	-1524	-1109	1.683	-.539	441529	.996
74665.9	1087.20	1.68	2.06	47094	432459	437750	-7835	-1544	-1174	1.685	-.571	435105	.973
73665.9	1089.60	1.55	2.07	46589	425676	430479	-7473	-1565	-1238	1.688	-.603	428077	.948
72665.9	1092.14	1.42	2.08	46083	418237	422553	-7087	-1588	-1302	1.691	-.636	420395	.922
71665.9	1094.83	1.28	2.08	45577	410089	413916	-6679	-1611	-1366	1.694	-.669	412002	.894
70665.9	1097.69	1.15	2.09	45070	401174	404512	-6245	-1637	-1430	1.697	-.702	402843	.865
69665.9	1100.72	1.00	2.10	44562	391438	394286	-5785	-1663	-1493	1.700	-.735	392862	.834
68665.9	1103.93	.86	2.11	44054	380827	383185	-5298	-1691	-1557	1.704	-.769	382006	.801
67665.9	1107.32	.70	2.12	43545	369294	371161	-4783	-1721	-1621	1.708	-.803	370227	.767
66665.9	1110.91	.55	2.13	43035	356799	358174	-4238	-1752	-1685	1.712	-.837	357486	.731

X(A)COORDINATES TABLE 3.1-21(CONTINUED) CSM-112/ LM-10 D.O.I. BURN

WEIGHT	X-BAR	Y-BAR	Z-BAR	IXX	IYY	IZZ	PXY	PXZ	PYZ	PITCH	YAW	AVERAGE	INERTIA/THRUST
LBS.		INCHES				SLUG-FT SQ				DEGREES		MOMENT	RATIO
65665.9	1114.69	.39	2.13	42525	343264	344148	-3668	-1786	-1749	1.716	-.871	343706	.693
64665.9	1118.69	.22	2.14	42014	328619	329010	-3058	-1821	-1812	1.720	-.906	328814	.654
63665.9	1122.91	.05	2.15	41502	312792	312688	-2417	-1857	-1876	1.724	-.940	312740	.613
62665.9	1127.39	-.13	2.16	40989	295508	294910	-1735	-1897	-1940	1.729	-.975	295209	.570

X(A)COORDINATES TABLE 3.1-22 CSM-112 CIRCULARIZATION BURN

WEIGHT LBS.	X-BAR	Y-BAR INCHES	Z-BAR	IXX	IYY	IZZ SLUG-FT SQ	PXY	PXZ	PYZ	PITCH DEGREES	YAW	AVERAGE MOMENT	INERTIA/THRUST RATIO
65784.3	933.20	4.81	5.15	35624	78185	79962	-2069	276	2425	-.797	1.806	79073	.449
64784.3	932.71	4.84	5.06	35104	77512	79719	-2059	235	2282	-.760	1.832	78616	.449
63784.3	932.32	4.86	4.96	34584	76923	79560	-2051	203	2139	-.717	1.856	78241	.448
62784.3	932.04	4.88	4.87	34064	76397	79464	-2045	181	1996	-.670	1.877	77930	.448
61784.3	931.87	4.91	4.77	33543	75916	79412	-2042	167	1854	-.618	1.856	77664	.447
60784.3	931.81	4.93	4.67	33022	75457	79384	-2040	163	1711	-.560	1.912	77420	.446
59784.3	931.87	4.96	4.56	32501	74999	79357	-2042	169	1569	-.497	1.925	77178	.444
58784.3	932.06	4.98	4.45	31980	74519	79307	-2045	185	1426	-.428	1.935	76913	.442
57784.3	932.39	5.01	4.34	31458	73992	79211	-2051	213	1284	-.355	1.941	76601	.439
56784.3	932.85	5.04	4.22	30936	73390	79040	-2060	253	1142	-.276	1.944	76215	.434
55784.3	933.47	5.07	4.10	30413	72685	78767	-2072	305	1000	-.192	1.943	75726	.429
54784.3	934.23	5.10	3.97	29891	71846	78361	-2087	370	857	-.103	1.938	75103	.422
53784.3	935.17	5.13	3.84	29367	70840	77787	-2106	448	715	-.009	1.929	74314	.414
52784.3	936.28	5.16	3.71	28843	69632	77012	-2128	542	574	.090	1.916	73322	.404
51784.3	937.58	5.20	3.57	28319	68182	75995	-2153	651	432	.192	1.899	72089	.392
50784.3	939.07	5.23	3.42	27795	66445	74692	-2182	777	290	.299	1.878	70569	.378
49784.3	940.77	5.27	3.27	27269	64396	73078	-2216	918	148	.409	1.853	68737	.363
48784.3	942.70	5.31	3.11	26744	61944	71060	-2254	1080	7	.523	1.824	66502	.345
47784.3	943.52	5.26	3.06	26233	60391	69511	-2309	1158	-97	.563	1.777	64951	.334
46784.3	942.97	5.13	3.09	25739	60294	68939	-2344	1166	-160	.538	1.726	64617	.334
45784.3	942.56	5.00	3.12	25245	60229	68399	-2371	1172	-223	.514	1.668	64314	.334
44784.3	942.26	4.86	3.16	24751	60192	67886	-2390	1177	-286	.491	1.603	64039	.333
43784.3	942.09	4.72	3.20	24256	60176	67394	-2401	1180	-349	.468	1.532	63785	.333
42784.3	942.05	4.57	3.24	23760	60174	66916	-2404	1190	-412	.447	1.455	63545	.331
41784.3	942.14	4.41	3.28	23264	60176	66441	-2400	1179	-474	.427	1.371	63309	.330
40784.3	942.36	4.25	3.32	22768	60170	65958	-2387	1175	-537	.408	1.280	63064	.328
39784.3	942.73	4.08	3.37	22271	60141	65451	-2365	1169	-599	.390	1.182	62796	.326
38784.3	943.27	3.90	3.41	21773	60071	64903	-2334	1160	-662	.374	1.078	62487	.322
37784.3	943.98	3.71	3.46	21275	59939	64293	-2293	1149	-724	.359	.966	62116	.318
36784.3	944.88	3.50	3.52	20777	59723	63598	-2239	1134	-786	.347	.848	61661	.314
35784.3	946.00	3.29	3.57	20277	59396	62790	-2173	1117	-847	.336	.722	61093	.308
34784.3	947.35	3.07	3.63	19777	58929	61842	-2092	1095	-909	.328	.589	60385	.300
33784.3	948.97	2.83	3.69	19276	58288	60720	-1996	1069	-970	.322	.450	59504	.292
32784.3	950.87	2.58	3.76	18773	57441	59391	-1882	1039	-1032	.320	.305	58416	.282
31784.3	953.09	2.31	3.83	18270	56350	57817	-1748	1004	-1093	.320	.153	57083	.270
30784.3	955.64	2.02	3.91	17766	54979	55962	-1594	963	-1153	.323	-.004	55470	.257
29784.3	958.57	1.72	3.99	17261	53290	53788	-1417	917	-1213	.329	-.165	53539	.242

X(A)COORDINATES TABLE 3.1-22(CONTINUED) CSM-112 CIRCULARIZATION BURN

WEIGHT LBS.	X-BAR	Y-BAR INCHES	Z-BAR	IXX	IYY	IZZ SLUG-FT SQ	PXY	PXZ	PYZ	PITCH DEGREES	YAW	AVERAGE MOMENT	INERTIA/THRUST RATIO
28784.3	961.92	1.39	4.07	16754	51228	51240	-1221	863	-1273	.338	-.331	51234	.226
27784.3	965.72	1.04	4.16	16245	48725	48248	-988	803	-1333	.350	-.500	48487	.208
26784.3	970.04	.67	4.26	15735	45718	44752	-727	734	-1392	.366	-.671	45235	.188
25784.3	975.00	.26	4.37	15223	42064	40608	-427	656	-1451	.385	-.845	41336	.166

X(A)COORDINATES TABLE 3.1-23 CSM-112 PLANE CHANGE 1

WEIGHT LBS.	X-BAR	Y-BAR INCHES	Z-BAR	IXX	IYY	IZZ SLUG-FT SQ	PXY	PXZ	PYZ	PITCH DEGREES	YAW	AVERAGE MOMENT	INERTIA/THRUST RATIO
65464.3	933.27	4.83	5.20	35389	77972	79831	-2065	249	2496	-.826	1.813	78901	.448
64464.3	932.78	4.85	5.11	34870	77301	79589	-2055	209	2353	-.789	1.839	78445	.447
63464.3	932.39	4.87	5.02	34350	76712	79430	-2047	177	2210	-.748	1.863	78071	.447
62464.3	932.11	4.90	4.92	33830	76187	79334	-2041	155	2068	-.701	1.885	77761	.446
61464.3	931.93	4.92	4.83	33309	75706	79283	-2037	141	1925	-.648	1.904	77494	.446
60464.3	931.88	4.95	4.72	32789	75247	79255	-2036	137	1783	-.591	1.920	77251	.445
59464.3	931.94	4.97	4.62	32268	74790	79228	-2037	143	1640	-.528	1.933	77009	.443
58464.3	932.14	5.00	4.51	31746	74310	79178	-2041	160	1498	-.460	1.943	76744	.440
57464.3	932.46	5.03	4.40	31225	73761	79081	-2047	188	1355	-.386	1.950	76431	.437
56464.3	932.93	5.06	4.28	30703	73179	78910	-2056	227	1213	-.307	1.953	76044	.433
55464.3	933.55	5.09	4.16	30180	72473	78635	-2068	278	1071	-.223	1.952	75554	.428
54464.3	934.32	5.12	4.03	29658	71633	78227	-2084	343	929	-.134	1.947	74930	.421
53464.3	935.27	5.15	3.90	29134	70625	77652	-2102	421	787	-.040	1.938	74138	.412
52464.3	936.39	5.18	3.77	28611	69414	76873	-2125	514	645	.059	1.925	73144	.402
51464.3	937.69	5.22	3.63	28087	67961	75854	-2150	622	503	.162	1.908	71908	.391
50464.3	939.20	5.25	3.48	27562	66221	74546	-2180	748	361	.269	1.887	70383	.377
49464.3	940.91	5.29	3.33	27037	64167	72927	-2214	888	220	.379	1.862	68547	.361
48464.3	942.86	5.33	3.17	26512	61709	70904	-2253	1049	78	.493	1.833	66306	.343
47464.3	943.69	5.28	3.12	26002	60153	69352	-2308	1126	-25	.534	1.786	64752	.333
46464.3	943.14	5.15	3.15	25508	60058	68782	-2343	1135	-88	.508	1.734	64420	.333
45464.3	942.72	5.02	3.19	25013	59994	68243	-2369	1141	-151	.483	1.676	64119	.332
44464.3	942.43	4.89	3.23	24519	59958	67731	-2388	1146	-214	.458	1.611	63844	.332
43464.3	942.26	4.74	3.27	24024	59942	67240	-2398	1149	-277	.435	1.540	63591	.331
42464.3	942.22	4.59	3.31	23528	59941	66761	-2401	1149	-340	.413	1.463	63351	.330
41464.3	942.31	4.44	3.35	23033	59942	66286	-2397	1148	-402	.392	1.378	63114	.328
40464.3	942.55	4.27	3.39	22536	59935	65802	-2384	1144	-465	.372	1.287	62869	.326
39464.3	942.93	4.10	3.44	22039	59905	65294	-2362	1137	-527	.353	1.189	62600	.324
38464.3	943.47	3.92	3.49	21542	59833	64744	-2331	1128	-589	.336	1.084	62289	.321
37464.3	944.19	3.72	3.54	21044	59699	64132	-2289	1116	-651	.321	.972	61916	.317
36464.3	945.11	3.52	3.60	20545	59480	63434	-2235	1101	-713	.307	.852	61457	.312
35464.3	946.24	3.31	3.66	20045	59149	62622	-2169	1082	-775	.296	.726	60886	.306
34464.3	947.62	3.08	3.72	19545	58676	61669	-2088	1060	-836	.287	.592	60172	.299
33464.3	949.26	2.84	3.79	19044	58028	60540	-1991	1033	-897	.281	.452	59284	.290
32464.3	951.18	2.59	3.86	18542	57173	59203	-1876	1001	-958	.278	.306	58188	.280
31464.3	953.43	2.32	3.93	18038	56072	57619	-1743	964	-1019	.277	.153	56845	.268
30464.3	956.03	2.03	4.01	17534	54688	55751	-1588	922	-1080	.280	-.005	55219	.255
29464.3	959.00	1.72	4.10	17028	52983	53562	-1410	873	-1140	.286	-.167	53273	.240

TABLE 3.1-23(CONTINUED)

CSM-112 PLANE CHANGE 1

	X(A)COORDINATES												
WEIGHT LBS.	X-BAR	Y-BAR INCHES	Z-BAR	IXX	IYY	IZZ SLUG-FT SQ	PXY	PXZ	PYZ	PITCH DEGREES	YAW	AVERAGE MOMENT	INERTIA/THRUST RATIO
28464.3	962.40	1.39	4.19	16521	50902	50994	-1213	816	-1199	.294	-.334	50948	.224
27464.3	966.27	1.03	4.28	16013	48374	47979	-979	753	-1259	.306	-.504	48176	.206
26464.3	970.65	.65	4.39	15503	45337	44453	-717	682	-1318	.322	-.677	44895	.185
25464.3	975.71	.24	4.50	14991	41646	40271	-415	599	-1376	.341	-.852	40958	.163

X(A)COORDINATES TABLE 3.1-24 CSM-112 T.E.I. BURN

WEIGHT LBS.	X-BAR	Y-BAR INCHES	Z-BAR	IXX	IYY	IZZ SLUG-FT SQ	PXY	PXZ	PYZ	PITCH DEGREES	YAW	AVERAGE MOMENT	INERTIA/THRUST RATIO
65502.2	933.57	4.96	5.05	35223	77688	79552	-1927	96	2534	-.732	1.879	78620	.445
64502.2	933.08	4.98	4.96	34703	77021	79315	-1916	55	2391	-.693	1.907	78168	.444
63502.2	932.70	5.01	4.87	34182	76435	79159	-1907	23	2249	-.650	1.932	77797	.444
62502.2	932.42	5.04	4.77	33662	75912	79065	-1901	1	2106	-.601	1.955	77489	.443
61502.2	932.25	5.06	4.67	33141	75432	79015	-1897	-12	1964	-.547	1.975	77224	.443
60502.2	932.20	5.09	4.56	32620	74973	78988	-1896	-15	1821	-.488	1.993	76980	.442
59502.2	932.27	5.12	4.45	32098	74515	78960	-1897	-9	1679	-.424	2.007	76737	.440
58502.2	932.47	5.15	4.34	31576	74032	78908	-1901	8	1537	-.355	2.018	76470	.437
57502.2	932.80	5.18	4.23	31054	73501	78808	-1908	37	1395	-.280	2.025	76155	.434
56502.2	933.28	5.21	4.11	30531	72894	78633	-1918	77	1253	-.200	2.029	75763	.430
55502.2	933.90	5.24	3.98	30008	72182	78353	-1932	131	1111	-.115	2.029	75268	.424
54502.2	934.68	5.27	3.85	29485	71335	77938	-1948	197	969	-.025	2.025	74637	.418
53502.2	935.63	5.31	3.72	28961	70319	77355	-1969	278	828	.070	2.017	73837	.409
52502.2	936.75	5.35	3.58	28437	69098	76567	-1993	374	686	.169	2.005	72833	.399
51502.2	938.07	5.38	3.44	27912	67634	75537	-2022	486	545	.272	1.989	71585	.388
50502.2	939.58	5.42	3.29	27387	65880	74217	-2055	615	403	.379	1.968	70048	.374
49502.2	941.29	5.46	3.13	26861	63812	72583	-2092	759	262	.490	1.943	68197	.358
48502.2	943.25	5.51	2.97	26335	61337	70543	-2135	925	121	.604	1.914	65940	.340
47502.2	944.09	5.46	2.91	25824	59774	68985	-2191	1004	16	.645	1.869	64379	.330
46502.2	943.55	5.34	2.94	25331	59683	68419	-2224	1012	-46	.622	1.820	64051	.330
45502.2	943.14	5.21	2.97	24837	59623	67884	-2249	1017	-109	.600	1.764	63754	.329
44502.2	942.86	5.08	3.01	24344	59589	67375	-2266	1021	-173	.579	1.702	63482	.329
43502.2	942.70	4.94	3.04	23849	59575	66886	-2276	1023	-236	.559	1.633	63231	.328
42502.2	942.67	4.80	3.08	23354	59574	66409	-2279	1024	-299	.540	1.558	62991	.327
41502.2	942.78	4.64	3.11	22859	59575	65933	-2274	1022	-362	.522	1.476	62754	.325
40502.2	943.02	4.48	3.15	22364	59566	65448	-2260	1018	-425	.505	1.388	62507	.323
39502.2	943.41	4.32	3.20	21868	59533	64937	-2239	1013	-488	.489	1.293	62235	.321
38502.2	943.96	4.14	3.24	21371	59456	64384	-2208	1005	-550	.475	1.190	61920	.317
37502.2	944.70	3.95	3.28	20874	59317	63766	-2166	994	-613	.462	1.081	61542	.313
36502.2	945.63	3.76	3.33	20376	59090	63061	-2114	980	-675	.452	.964	61076	.308
35502.2	946.78	3.55	3.38	19877	58750	62241	-2049	964	-737	.443	.840	60496	.302
34502.2	948.16	3.33	3.44	19378	58266	61277	-1969	944	-799	.437	.710	59771	.295
33502.2	949.82	3.10	3.50	18878	57606	60136	-1874	920	-861	.433	.572	58871	.287
32502.2	951.76	2.85	3.56	18377	56734	58783	-1762	892	-923	.432	.428	57759	.277
31502.2	954.03	2.59	3.62	17875	55615	57182	-1632	860	-984	.433	.278	56399	.265
30502.2	956.64	2.31	3.69	17372	54211	55295	-1481	822	-1045	.438	.123	54753	.252
29502.2	959.63	2.01	3.76	16868	52483	53083	-1308	780	-1106	.445	-.038	52783	.237

X(A)COORDINATES TABLE 3.1-24(CONTINUED) CSM-112 T.E.I. BURN

WEIGHT	X-BAR	Y-BAR	Z-BAR	IXX	IYY	IZZ	PXY	PXZ	PYZ	PITCH	YAW	AVERAGE	INERTIA/THRUST
LBS.		INCHES				SLUG-FT SQ				DEGREES		MOMENT	RATIO
28502.2	963.04	1.69	3.84	16363	50375	50489	-1115	730	-1167	.455	-.203	50432	.221
27502.2	966.93	1.35	3.93	15856	47817	47445	-887	675	-1227	.468	-.371	47631	.202
26502.2	971.33	.98	4.02	15347	44746	43886	-632	612	-1287	.484	-.542	44316	.182
25502.2	976.41	.59	4.12	14837	41016	39666	-338	539	-1347	.504	-.715	40341	.160

X(E)COORDINATES TABLE 3.1-25 LM-10 PRE P.D.I. TO TOUCHDOWN

WEIGHT LBS.	X-BAR	Y-BAR INCHES	Z-BAR	IXX	IYY	IZZ SLUG-FT SQ	PXY	PXZ	PYZ	PILOT RCLL	PILOT PITCH DEGREES
36607.1	185.02	.43	-.33	26877	28142	26749	-16	852	166	.791	.616
36083.3	185.27	.43	-.34	26547	27931	26612	-17	852	167	.793	.617
35559.5	185.51	.44	-.34	26217	27716	26472	-17	852	167	.797	.619
35035.7	185.73	.44	-.34	25887	27499	26329	-17	852	168	.800	.621
34511.9	185.94	.45	-.35	25557	27281	26185	-18	853	169	.804	.624
33988.1	186.15	.45	-.35	25227	27061	26040	-18	853	170	.809	.626
33464.3	186.35	.46	-.36	24897	26841	25894	-18	853	170	.814	.629
32940.5	186.57	.47	-.36	24567	26619	25747	-19	853	171	.818	.633
32416.6	186.79	.47	-.36	24237	26397	25599	-19	853	172	.823	.636
31892.8	187.03	.48	-.37	23907	26173	25449	-19	853	173	.828	.639
31369.0	187.29	.48	-.37	23577	25946	25297	-20	853	174	.832	.641
30845.2	187.57	.49	-.38	23247	25716	25141	-20	854	174	.837	.644
30321.4	187.88	.50	-.38	22917	25482	24981	-21	854	175	.840	.646
29797.6	188.21	.50	-.39	22587	25241	24815	-21	854	176	.844	.648
29273.8	188.58	.51	-.39	22257	24994	24642	-22	855	177	.847	.650
28750.0	188.99	.52	-.40	21927	24737	24460	-23	855	177	.849	.651
28226.2	189.44	.53	-.40	21597	24470	24267	-24	856	178	.851	.652
27702.4	189.92	.53	-.41	21268	24192	24063	-25	857	179	.853	.652
27178.5	190.45	.54	-.41	20938	23899	23844	-26	857	180	.854	.652
26654.7	191.03	.55	-.42	20608	23588	23608	-27	858	181	.854	.652
26130.9	191.66	.56	-.43	20278	23269	23364	-29	859	181	.854	.651
25607.1	192.33	.57	-.43	19948	22935	23104	-30	860	182	.853	.649
25083.3	193.06	.58	-.44	19618	22585	22828	-32	862	183	.851	.647
24559.5	193.84	.59	-.45	19288	22219	22537	-34	863	184	.849	.645
24035.7	194.68	.60	-.46	18958	21837	22229	-36	864	184	.847	.643
23511.9	195.58	.61	-.46	18628	21438	21904	-38	866	185	.844	.640
22988.1	196.53	.62	-.47	18298	21022	21563	-41	868	186	.841	.637
22464.3	197.55	.64	-.48	17968	20589	21204	-43	869	187	.838	.633
21940.4	198.63	.65	-.49	17638	20138	20827	-46	871	188	.834	.630
21416.6	199.78	.66	-.50	17308	19669	20433	-49	874	188	.830	.626
20892.8	201.00	.68	-.51	16978	19182	20020	-52	876	189	.826	.622
20369.0	202.29	.69	-.52	16648	18677	19589	-56	878	190	.821	.618
19845.2	203.66	.71	-.53	16318	18149	19136	-59	881	191	.817	.614
19321.4	205.11	.72	-.54	15988	17604	18665	-63	883	191	.812	.609
18797.6	206.64	.74	-.56	15658	17040	18176	-67	886	192	.807	.605
18273.8	208.25	.76	-.57	15328	16457	17666	-71	889	193	.803	.601
17750.8	209.96	.78	-.58	14998	15852	17136	-75	892	194	.798	.597

X(E)COORDINATES TABLE 3.1-26 LM-10 AS LUNAR LIFTOFF TO INSERTION

WEIGHT LBS.	X-BAR	Y-BAR INCHES	Z-BAR	IXX	IYY	IZZ SLUG-FT SQ.	PXY	PXZ	PYZ	ROLL MOMENT OFFSET (DEG./SEC. SQ.)	PITCH MOMENT
10754.8	244.00	.06	2.48	6696	3345	5896	-11	195	47	.162	7.696
10494.8	244.40	.06	2.54	6518	3330	5703	-11	192	47	.175	7.477
10234.8	244.82	.06	2.61	6339	3314	5510	-11	190	47	.188	7.245
9974.8	245.26	.07	2.68	6161	3297	5315	-11	188	47	.204	6.998
9714.8	245.72	.07	2.75	5982	3279	5120	-11	185	47	.220	6.736
9454.8	246.21	.07	2.82	5804	3261	4924	-11	182	47	.239	6.456
9194.8	246.72	.07	2.90	5625	3241	4727	-12	179	47	.260	6.156
8934.8	247.26	.08	2.99	5446	3221	4528	-12	176	47	.283	5.836
8674.8	247.84	.08	3.08	5268	3199	4329	-12	173	47	.309	5.491
8414.8	248.46	.08	3.17	5089	3175	4128	-12	169	47	.339	5.120
8154.8	249.11	.09	3.27	4910	3151	3926	-12	165	47	.373	4.719
7894.8	249.80	.09	3.38	4732	3124	3722	-12	161	47	.412	4.285
7634.8	250.55	.10	3.50	4553	3096	3516	-12	157	47	.458	3.813
7374.8	251.34	.10	3.62	4374	3066	3308	-13	152	47	.510	3.298
7114.8	252.19	.11	3.75	4195	3033	3098	-13	148	47	.572	2.734
6854.8	253.11	.11	3.89	4016	2998	2886	-13	142	47	.646	2.114
6594.8	254.10	.12	4.05	3837	2961	2671	-13	137	47	.735	1.428
6334.8	255.17	.13	4.21	3658	2920	2453	-13	130	47	.843	.666
6074.8	256.33	.13	4.39	3479	2876	2232	-14	124	47	.979	-.185
5814.8	257.60	.14	4.59	3300	2827	2007	-14	116	47	1.151	-1.143

XE COORDINATES TABLE 3.1-27 LM-10 T.P.I.

WEIGHT	X-BAR	Y-BAR	Z-BAR	IXX	IYY	IZZ	PXY	PXZ	PYZ
LBS.		INCHES				SLUG-FT SQ			
5798.8	257.20	.14	4.61	3308	2823	2015	-14	119	49
5772.8	257.33	.14	4.63	3290	2819	1993	-14	118	49
5746.8	257.47	.14	4.65	3272	2814	1970	-14	117	49
5720.8	257.60	.14	4.67	3254	2809	1947	-14	117	49
5694.8	257.73	.14	4.69	3236	2803	1924	-14	116	49
5668.8	257.87	.14	4.71	3218	2798	1902	-14	115	49
5642.8	258.01	.14	4.73	3200	2793	1879	-14	114	49
5616.8	258.15	.14	4.75	3182	2788	1856	-14	113	49
5590.8	258.29	.14	4.78	3164	2783	1833	-14	113	49
5564.8	258.43	.15	4.80	3146	2777	1810	-14	112	49
5538.8	258.57	.15	4.82	3128	2772	1787	-14	111	49
5512.8	258.72	.15	4.84	3110	2767	1764	-14	110	49
5486.8	258.86	.15	4.87	3092	2761	1741	-14	109	49

4.0 CSM REFERENCE CONSUMABLE MASS PROPERTIES DATA

The data presented in this section will enable the user to obtain the separate centers-of-gravity and moments-of-inertia for those spacecraft consumables on-board that significantly affect overall CSM and CM performance. CSM consumables mass property data must be compared to the current on-board consumable loading data for each mission provided in Section 3.0. The mass property data are presented in the following sections:

4.1 SPS Tank Consumables Mass Properties, Trapped Propellants, SPS Density Equations and Graphs, and SPS Loading Windows.

4.2 RCS/ECS/EPS Consumables Mass Properties, and SM RCS Quad Mass Properties

4.3 CSM RCS Load Calculation Tables and Loading Windows

4.4 CM Ablator Data

TABLE 4.1-1

Table 4.1-1 presents the mass characteristics for the SM/SPS propellant tanks.

The following units apply to the indicated headings:

Height of Propellant - Inches	Mass of Propellant - Pounds
Tank Volume Unstretched - Ft^3	Center of Mass - X_A Coordinates - Inches
Tank Volume Stretched - Ft^3	Moment of Inertia (I_{YY}) - Slug-ft^2

Further, Moment of Inertia I_{ZZ} = Moment of Inertia I_{YY}; Moment of Inertia $I_{XX}=0.0$ for all propellant weights; tank pressure used in calculating this table was 175±5 PSIA, propellant temperature was 70°F, density for fuel was 56.43 lb/ft^3, and oxidizer density was 90.21 lb/ft^3.

The Y_A and Z_A Center of Mass components for the individual tanks are constant and are as follows:

	Y_A (inches)	Z_A (inches)
Fuel Storage	-14.8	-47.8
Fuel Sump	-48.3	-6.6
Oxidizer Storage	14.8	47.8
Oxidizer Sump	48.3	6.6

TABLE 4.1-1 (CONTINUED)

FUEL STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
2.00	0.09	0.09	5.0	834.2	0.0
3.00	0.28	0.28	16.0	834.2	0.0
4.00	0.54	0.55	30.9	834.8	0.0
5.00	0.87	0.88	49.8	835.4	0.0
6.00	1.27	1.28	72.2	836.1	1.0
7.00	1.72	1.74	98.1	836.7	1.5
8.00	2.23	2.25	127.1	837.3	1.8
9.00	2.79	2.82	159.2	838.0	2.5
10.00	3.41	3.43	194.1	838.6	3.0
11.00	4.06	4.10	231.6	839.2	3.5
12.00	4.76	4.80	271.4	839.8	4.0
13.00	5.50	5.55	313.4	840.5	4.5
14.00	6.27	6.32	357.4	841.1	5.0
15.00	7.07	7.13	403.2	841.7	6.0
16.00	7.90	7.97	450.5	842.3	7.0
17.00	8.76	8.83	499.2	842.9	8.0
18.00	9.63	9.71	549.0	843.5	9.0
19.00	10.52	10.61	599.7	844.1	10.0
20.00	11.42	11.52	651.2	844.7	11.0
21.00	12.34	12.44	703.2	845.2	12.0
22.00	13.25	13.37	755.4	845.8	12.8
22.50	13.71	13.83	781.6	846.1	13.9
23.00	14.17	14.29	807.8	846.4	14.8
24.00	15.09	15.22	860.2	846.9	15.7
25.00	16.01	16.15	912.6	847.5	16.8
26.00	16.93	17.08	965.1	848.0	17.3
27.00	17.85	18.00	1017.5	848.5	18.2
28.00	18.77	18.93	1069.9	849.1	19.0
29.00	19.69	19.86	1122.3	849.6	20.0
30.00	20.61	20.78	1174.7	850.1	21.1
31.00	21.53	21.71	1227.1	850.7	22.6
32.00	22.45	22.64	1279.5	851.2	23.9
33.00	23.37	23.57	1331.9	851.7	25.0
34.00	24.28	24.49	1384.3	852.2	26.5
35.00	25.20	25.42	1436.7	852.7	27.7
36.00	26.12	26.35	1489.1	853.3	29.0
37.00	27.04	27.27	1541.5	853.8	30.6

TABLE 4.1-1 (CONTINUED)

FUEL STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
38.00	27.96	28.20	1593.9	854.3	32.0
39.00	28.88	29.13	1646.3	854.8	33.8
40.00	29.80	30.06	1698.7	855.3	35.7
41.00	30.72	30.98	1751.1	855.8	37.0
42.00	31.64	31.91	1803.5	856.3	38.7
43.00	32.56	32.84	1855.9	856.9	40.5
44.00	33.48	33.76	1908.3	857.4	42.6
45.00	34.40	34.69	1960.7	857.9	44.9
46.00	35.32	35.62	2013.1	858.4	47.5
47.00	36.24	36.55	2065.5	858.9	50.3
48.00	37.15	37.47	2117.9	859.4	53.3
49.00	38.07	38.40	2170.3	859.9	56.6
50.00	38.99	39.33	2222.7	860.4	60.2
51.00	39.91	40.25	2275.1	860.9	64.0
52.00	40.83	41.18	2327.5	861.4	68.1
53.00	41.75	42.11	2379.9	861.9	72.4
54.00	42.67	43.04	2432.3	862.5	77.0
55.00	43.59	43.96	2484.7	863.0	81.8
56.00	44.51	44.89	2537.1	863.5	87.0
57.00	45.43	45.82	2589.5	864.0	92.4
58.00	46.35	46.74	2641.9	864.5	98.1
59.00	47.27	47.67	2694.3	865.0	104.1
60.00	48.19	48.60	2746.7	865.5	110.4
61.00	49.11	49.53	2799.1	866.0	117.0
62.00	50.02	50.45	2851.5	866.5	124.0
63.00	50.94	51.38	2903.9	867.0	131.2
64.00	51.86	52.31	2956.3	867.5	138.7
65.00	52.78	53.23	3008.7	868.0	146.6
66.00	53.70	54.16	3061.1	868.5	154.8
67.00	54.62	55.09	3113.5	869.0	163.3
68.00	55.54	56.02	3165.9	869.5	172.2
69.00	56.46	56.94	3218.3	870.0	181.4
70.00	57.38	57.87	3270.7	870.5	191.0
71.00	58.30	58.80	3323.1	871.0	201.0
72.00	59.22	59.72	3375.5	871.5	211.3
73.00	60.14	60.65	3427.9	872.0	221.9
74.00	61.06	61.58	3480.3	872.5	233.0

TABLE 4.1-1 (CONTINUED)

FUEL STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
75.00	61.98	62.51	3532.7	873.0	244.4
76.00	62.89	63.43	3585.1	873.5	256.2
77.00	63.81	64.36	3637.5	874.0	268.4
78.00	64.73	65.29	3689.9	874.6	281.1
79.00	65.65	66.21	3742.3	875.1	294.1
80.00	66.57	67.14	3794.8	875.6	307.5
81.00	67.49	68.07	3847.2	876.1	321.3
82.00	68.41	69.00	3899.6	876.6	335.6
83.00	69.33	69.92	3952.0	877.1	350.3
84.00	70.25	70.85	4004.4	877.6	365.4
85.00	71.17	71.78	4056.8	878.1	381.0
86.00	72.09	72.70	4109.2	878.6	397.0
87.00	73.01	73.63	4161.6	879.1	413.4
88.00	73.93	74.56	4214.0	879.6	430.3
89.00	74.85	75.49	4266.4	880.1	447.7
90.00	75.76	76.41	4318.8	880.6	465.5
91.00	76.68	77.34	4371.2	881.1	483.8
92.00	77.60	78.27	4423.6	881.6	502.6
93.00	78.52	79.19	4476.0	882.1	521.9
94.00	79.44	80.12	4528.4	882.6	541.7
95.00	80.36	81.05	4580.8	883.1	561.9
96.00	81.28	81.97	4633.2	883.6	582.7
97.00	82.20	82.90	4685.6	884.1	603.9
98.00	83.12	83.83	4738.0	884.6	625.7
99.00	84.04	84.76	4790.4	885.1	648.0
100.00	84.96	85.68	4842.8	885.6	670.8
101.00	85.88	86.61	4895.2	886.1	694.2
102.00	86.80	87.54	4947.6	886.6	718.1
103.00	87.71	88.46	5000.0	887.1	742.5
104.00	88.63	89.39	5052.4	887.6	767.5
105.00	89.55	90.32	5104.8	888.1	793.0
106.00	90.47	91.25	5157.2	888.6	819.1
107.00	91.39	92.17	5209.6	889.1	845.8
108.00	92.31	93.10	5262.0	889.6	873.0
109.00	93.23	94.03	5314.4	890.1	900.8
110.00	94.15	94.95	5366.8	890.6	929.2
111.00	95.07	95.88	5419.2	891.1	958.2

TABLE 4.1-1 (CONTINUED)

FUEL STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
112.00	95.99	96.81	5471.6	891.6	987.7
113.00	96.91	97.74	5524.0	892.1	1017.9
114.00	97.83	98.66	5576.4	892.6	1048.7
115.00	98.75	99.59	5628.8	893.1	1080.1
116.00	99.67	100.52	5681.2	893.6	1112.1
117.00	100.58	101.44	5733.6	894.1	1144.7
118.00	101.50	102.37	5786.0	894.6	1177.9
119.00	102.42	103.30	5838.4	895.1	1211.8
120.00	103.34	104.23	5890.8	895.6	1246.3
121.00	104.26	105.15	5943.2	896.1	1281.5
122.00	105.18	106.08	5995.6	896.6	1317.3
123.00	106.10	107.01	6048.0	897.1	1353.8
124.00	107.02	107.93	6100.4	897.6	1390.9
125.00	107.94	108.86	6152.8	898.1	1428.7
126.00	108.86	109.79	6205.2	898.6	1467.2
127.00	109.78	110.72	6257.6	899.1	1506.4
128.00	110.70	111.64	6310.0	899.6	1546.2
129.00	111.62	112.57	6362.4	900.1	1586.8
130.00	112.54	113.50	6414.8	900.6	1628.0
131.00	113.45	114.42	6467.2	901.1	1669.9
132.00	114.37	115.35	6519.6	901.6	1712.6
132.20	114.56	115.54	6530.1	901.7	1721.2
133.00	115.29	116.28	6572.0	902.1	1755.9
134.00	116.21	117.20	6624.3	902.6	1799.8
135.00	117.12	118.12	6676.1	903.1	1844.1
136.00	118.02	119.03	6727.4	903.6	1888.7
137.00	118.90	119.92	6777.8	904.1	1933.2
138.00	119.77	120.80	6827.3	904.6	1977.5
139.00	120.62	121.65	6875.6	905.0	2021.4
140.00	121.44	122.48	6922.5	905.5	2064.6
141.00	122.23	123.28	6967.7	905.9	2106.9
142.00	123.00	124.05	7011.2	906.3	2148.0
143.00	123.72	124.78	7052.6	906.7	2187.7
144.00	124.41	125.47	7091.7	907.1	2225.7
145.00	125.05	126.12	7128.4	907.5	2261.8
146.00	125.65	126.73	7162.5	907.8	2295.5
147.00	126.20	127.28	7193.7	908.1	2326.7

TABLE 4.1-1 (CONTINUED)

FUEL STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
148.00	126.69	127.78	7221.8	908.4	2355.1
149.00	127.13	128.22	7246.7	908.6	2380.4
150.00	127.50	128.59	7268.1	908.9	2402.3
151.00	127.81	128.91	7285.7	909.0	2420.5
152.00	128.06	129.15	7299.5	909.2	2434.7
153.00	128.23	129.32	7309.2	909.3	2444.7
154.00	128.32	129.42	7314.6	909.3	2450.3
154.70	128.34	129.44	7315.7	909.3	2451.5

TABLE 4.1-1 (CONTINUED)

FUEL SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
4.00	5.02	5.02	283.7	860.5	12.0
5.00	5.31	5.31	300.3	859.1	12.0
6.00	5.67	5.68	321.2	857.7	12.0
7.00	6.11	6.12	346.1	856.3	12.0
8.00	6.61	6.63	374.9	855.0	12.0
9.00	7.18	7.21	407.3	853.9	12.0
10.00	7.81	7.84	443.1	852.9	12.0
11.00	8.49	8.53	482.1	852.0	12.0
12.00	9.23	9.27	524.1	851.3	12.1
13.00	10.01	10.07	568.9	850.8	12.2
14.00	10.85	10.91	616.3	850.4	12.3
15.00	11.72	11.79	666.1	850.1	12.4
16.00	12.63	12.71	718.1	849.9	12.5
17.00	13.57	13.66	772.0	849.8	12.7
18.00	14.55	14.65	827.7	849.8	12.8
19.00	15.56	15.66	885.0	849.8	13.0
20.00	16.58	16.70	943.6	849.9	13.3
21.00	17.63	17.75	1003.3	850.1	13.5
22.00	18.69	18.83	1064.0	850.2	13.8
23.00	19.77	19.91	1125.4	850.5	14.0
24.00	20.86	21.01	1187.3	850.7	14.3
25.00	21.95	22.11	1249.5	851.0	14.6
25.50	22.49	22.66	1280.7	851.2	14.9
26.00	23.04	23.21	1311.8	851.3	15.2
27.00	24.13	24.31	1374.0	851.6	15.4
28.00	25.22	25.41	1436.2	852.0	15.7
29.00	26.31	26.51	1498.4	852.3	16.0
30.00	27.41	27.61	1560.7	852.7	16.7
31.00	28.50	28.71	1622.9	853.1	17.1
32.00	29.59	29.82	1685.1	853.5	17.6
33.00	30.68	30.92	1747.3	853.8	18.2
34.00	31.77	32.02	1809.5	854.2	18.7
35.00	32.86	33.12	1871.8	854.7	19.2
36.00	33.96	34.22	1934.0	855.1	20.0
37.00	35.05	35.32	1996.2	855.5	20.6
38.00	36.14	36.42	2058.4	855.9	21.2
39.00	37.23	37.52	2120.6	856.3	22.1

TABLE 4.1-1 (CONTINUED)

FUEL SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
40.00	38.32	38.62	2182.9	856.8	23.0
41.00	39.41	39.72	2245.1	857.2	24.3
42.00	40.51	40.82	2307.3	857.6	25.8
43.00	41.60	41.92	2369.5	858.1	27.7
44.00	42.69	43.03	2431.7	858.5	29.9
45.00	43.78	44.13	2494.0	859.0	32.3
46.00	44.87	45.23	2556.2	859.4	35.1
47.00	45.96	46.33	2618.4	859.9	38.1
48.00	47.06	47.43	2680.6	860.3	41.5
49.00	48.15	48.53	2742.8	860.8	45.1
50.00	49.24	49.63	2805.1	861.2	49.0
51.00	50.33	50.73	2867.3	861.7	53.2
52.00	51.42	51.83	2929.5	862.2	57.7
53.00	52.51	52.93	2991.7	862.6	62.5
54.00	53.61	54.03	3053.9	863.1	67.6
55.00	54.70	55.13	3116.2	863.6	73.1
56.00	55.79	56.24	3178.4	864.0	78.8
57.00	56.88	57.34	3240.6	864.5	84.9
58.00	57.97	58.44	3302.8	865.0	91.4
58.02	57.99	58.46	3304.1	865.0	91.5
59.00	59.15	59.62	3369.8	865.5	100.8
60.00	60.33	60.81	3436.9	866.0	108.2
61.00	61.50	62.00	3504.1	866.5	115.9
62.00	62.68	63.18	3571.2	867.0	123.9
63.00	63.86	64.37	3638.3	867.5	132.4
64.00	65.04	65.56	3705.4	868.0	141.2
65.00	66.21	66.75	3772.5	868.5	150.5
66.00	67.39	67.93	3839.6	869.0	160.1
67.00	68.57	69.12	3906.7	869.5	170.2
68.00	69.75	70.31	3973.8	870.0	180.7
69.00	70.92	71.50	4040.9	870.5	191.6
70.00	72.10	72.68	4108.0	871.0	203.0
71.00	73.28	73.87	4175.1	871.5	214.8
72.00	74.46	75.06	4242.3	872.0	227.1
73.00	75.63	76.25	4309.4	872.6	239.8
74.00	76.81	77.43	4376.5	873.1	253.0
75.00	77.99	78.62	4443.6	873.6	266.7

TABLE 4.1-1 (CONTINUED)

FUEL SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
76.00	79.16	79.81	4510.7	874.1	280.8
77.00	80.34	81.00	4577.8	874.6	295.5
78.00	81.52	82.18	4644.9	875.1	310.7
79.00	82.70	83.37	4712.0	875.6	326.4
80.00	83.87	84.56	4779.1	876.1	342.6
81.00	85.05	85.74	4846.2	876.6	359.3
82.00	86.23	86.93	4913.3	877.1	376.5
83.00	87.41	88.12	4980.4	877.6	394.3
84.00	88.58	89.31	5047.6	878.1	412.7
85.00	89.76	90.49	5114.7	878.6	431.6
86.00	90.94	91.68	5181.8	879.1	451.1
87.00	92.12	92.87	5248.9	879.6	471.1
88.00	93.29	94.06	5316.0	880.1	491.7
89.00	94.47	95.24	5383.1	880.6	512.9
90.00	95.65	96.43	5450.2	881.1	534.7
91.00	96.83	97.62	5517.3	881.6	557.2
92.00	98.00	98.81	5584.4	882.1	580.2
93.00	99.18	99.99	5651.5	882.6	603.8
94.00	100.36	101.18	5718.6	883.1	628.1
95.00	101.54	102.37	5785.8	883.6	653.0
96.00	102.71	103.55	5852.9	884.1	678.5
97.00	103.89	104.74	5920.0	884.6	704.7
98.00	105.07	105.93	5987.1	885.1	731.5
99.00	106.25	107.12	6054.2	885.6	759.0
100.00	107.42	108.30	6121.3	886.1	787.2
101.00	108.60	109.49	6188.4	886.6	816.1
102.00	109.78	110.68	6255.5	887.1	845.6
103.00	110.96	111.87	6322.6	887.6	875.9
104.00	112.13	113.05	6389.7	888.1	906.8
105.00	113.31	114.24	6456.8	888.7	938.4
106.00	114.49	115.43	6523.9	889.2	970.8
107.00	115.67	116.62	6591.1	889.7	1003.9
108.00	116.84	117.80	6658.2	890.2	1037.7
109.00	118.02	118.99	6725.3	890.7	1072.2
110.00	119.20	120.18	6792.4	891.2	1107.5
111.00	120.38	121.36	6859.5	891.7	1143.6
112.00	121.55	122.55	6926.6	892.2	1180.4

TABLE 4.1-1 (CONTINUED)

FUEL SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
113.00	122.73	123.74	6993.7	892.7	1218.0
114.00	123.91	124.93	7060.8	893.2	1256.4
115.00	125.09	126.11	7127.9	893.7	1295.5
116.00	126.26	127.30	7195.0	894.2	1335.4
117.00	127.44	128.49	7262.1	894.7	1376.2
118.00	128.62	129.68	7329.2	895.2	1417.7
119.00	129.79	130.86	7396.4	895.7	1460.0
120.00	130.97	132.05	7463.5	896.2	1503.2
121.00	132.15	133.24	7530.6	896.7	1547.2
122.00	133.33	134.43	7597.7	897.2	1592.0
123.00	134.50	135.61	7664.8	897.7	1637.7
124.00	135.68	136.80	7731.9	898.2	1684.2
125.00	136.86	137.99	7799.0	898.7	1731.6
126.00	138.04	139.17	7866.1	899.2	1779.8
127.00	139.21	140.36	7933.2	899.7	1829.0
128.00	140.39	141.55	8000.3	900.2	1879.0
128.30	140.75	141.91	8020.5	900.3	1894.1
129.00	141.57	142.74	8067.4	900.7	1929.8
130.00	142.74	143.92	8134.4	901.2	1981.5
131.00	143.91	145.10	8201.0	901.7	2033.8
132.00	145.07	146.27	8267.0	902.2	2086.5
132.90	146.10	147.31	8325.8	902.6	2134.1
133.00	146.22	147.42	8332.3	902.7	2139.5
134.00	147.35	148.56	8396.8	903.2	2192.7
135.00	148.46	149.69	8460.2	903.6	2245.8
136.00	149.55	150.78	8522.2	904.1	2298.5
137.00	150.61	151.85	8582.5	904.6	2350.7
138.00	151.63	152.89	8641.1	905.0	2402.0
139.00	152.63	153.89	8697.6	905.4	2452.3
140.00	153.58	154.85	8752.0	905.8	2501.2
141.00	154.49	155.77	8803.9	906.2	2548.6
142.00	155.36	156.64	8853.2	906.6	2594.0
143.00	156.17	157.46	8899.6	907.0	2637.4
144.00	156.93	158.23	8943.0	907.3	2678.3
145.00	157.64	158.94	8983.1	907.6	2716.6
146.00	158.28	159.59	9019.8	907.9	2751.8
147.00	158.86	160.17	9052.8	908.1	2783.8

TABLE 4.1-1 (CONTINUED)

FUEL SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
148.00	159.37	160.69	9082.0	908.4	2812.2
149.00	159.81	161.13	9107.0	908.6	2836.8
150.00	160.17	161.50	9127.8	908.7	2857.3
151.00	160.46	161.78	9144.0	908.9	2873.4
152.00	160.66	161.99	9155.6	909.0	2884.9
153.00	160.78	162.11	9162.2	909.0	2891.5
153.80	160.81	162.14	9163.9	909.0	2893.1

TABLE 4.1-1 (CONTINUED)

OXIDIZER STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
2.00	0.09	0.09	8.0	834.2	0.1
3.00	0.28	0.28	25.5	834.2	0.4
4.00	0.54	0.55	49.4	834.8	0.9
5.00	0.87	0.88	79.4	835.4	1.6
6.00	1.27	1.28	115.2	836.1	2.3
7.00	1.72	1.74	156.4	836.7	3.1
8.00	2.23	2.25	202.8	837.3	4.1
9.00	2.79	2.82	254.0	838.0	5.2
10.00	3.41	3.43	309.6	838.6	6.3
11.00	4.06	4.10	369.4	839.2	7.6
12.00	4.76	4.80	432.9	839.8	8.9
13.00	5.50	5.55	500.0	840.5	10.3
14.00	6.27	6.32	570.2	841.1	11.6
15.00	7.07	7.13	643.1	841.7	13.2
16.00	7.90	7.97	718.6	842.3	14.7
17.00	8.76	8.83	796.2	842.9	16.4
18.00	9.63	9.71	875.7	843.5	18.0
19.00	10.52	10.61	956.6	844.1	19.8
20.00	11.42	11.52	1038.7	844.7	21.4
21.00	12.34	12.44	1121.6	845.2	23.2
22.00	13.25	13.37	1205.0	845.8	24.9
22.50	13.71	13.83	1246.8	846.1	25.8
23.00	14.17	14.29	1288.5	846.4	26.7
24.00	15.09	15.22	1372.1	846.9	28.5
25.00	16.01	16.15	1455.7	847.5	30.3
26.00	16.93	17.08	1539.3	848.0	32.8
27.00	17.85	18.00	1622.9	848.5	33.7
28.00	18.77	18.93	1706.5	849.1	35.5
29.00	19.69	19.86	1790.0	849.6	37.3
30.00	20.61	20.78	1873.6	850.1	39.0
31.00	21.53	21.71	1957.2	850.7	40.7
32.00	22.45	22.64	2040.8	851.2	42.6
33.00	23.37	23.57	2124.4	851.7	44.3
34.00	24.28	24.49	2207.9	852.2	46.0
35.00	25.20	25.42	2291.5	852.7	47.8
36.00	26.12	26.35	2375.1	853.3	49.5
37.00	27.04	27.27	2458.7	853.8	51.3

TABLE 4.1-1 (CONTINUED)

OXIDIZER STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
38.00	27.96	28.20	2542.3	854.3	53.2
39.00	28.88	29.13	2625.9	854.8	55.2
40.00	29.80	30.06	2709.4	855.3	56.9
41.00	30.72	30.98	2793.0	855.8	59.1
42.00	31.64	31.91	2876.6	856.3	61.7
43.00	32.56	32.84	2960.2	856.9	64.6
44.00	33.48	33.76	3043.8	857.4	68.0
45.00	34.40	34.69	3127.3	857.9	71.7
46.00	35.32	35.62	3210.9	858.4	75.8
47.00	36.24	36.55	3294.5	858.9	80.2
48.00	37.15	37.47	3378.1	859.4	85.1
49.00	38.07	38.40	3461.7	859.9	90.4
50.00	38.99	39.33	3545.2	860.4	96.0
51.00	39.91	40.25	3628.8	860.9	102.1
52.00	40.83	41.18	3712.4	861.4	108.6
53.00	41.75	42.11	3796.0	861.9	115.5
54.00	42.67	43.04	3879.6	862.5	122.8
55.00	43.59	43.96	3963.2	863.0	130.6
56.00	44.51	44.89	4046.7	863.5	138.8
57.00	45.43	45.82	4130.3	864.0	147.4
58.00	46.35	46.74	4213.9	864.5	156.5
59.00	47.27	47.67	4297.5	865.0	166.1
60.00	48.19	48.60	4381.1	865.5	176.2
61.00	49.11	49.53	4464.6	866.0	186.7
62.00	50.02	50.45	4548.2	866.5	197.7
63.00	50.94	51.38	4631.8	867.0	209.3
64.00	51.86	52.31	4715.4	867.5	221.3
65.00	52.78	53.23	4799.0	868.0	233.9
66.00	53.70	54.16	4882.6	868.5	246.9
67.00	54.62	55.09	4966.1	869.0	260.6
68.00	55.54	56.02	5049.7	869.5	274.7
69.00	56.46	56.94	5133.3	870.0	289.4
70.00	57.38	57.87	5216.9	870.5	304.7
71.00	58.30	58.80	5300.5	871.0	320.6
72.00	59.22	59.72	5384.0	871.5	337.0
73.00	60.14	60.65	5467.6	872.0	354.0
74.00	61.06	61.58	5551.2	872.5	371.6

TABLE 4.1-1 (CONTINUED)

OXIDIZER STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
75.00	61.98	62.51	5634.8	873.0	389.9
76.00	62.89	63.43	5718.4	873.5	408.7
77.00	63.81	64.36	5802.0	874.0	428.2
78.00	64.73	65.29	5885.5	874.6	448.3
79.00	65.65	66.21	5969.1	875.1	469.1
80.00	66.57	67.14	6052.7	875.6	490.5
81.00	67.49	68.07	6136.3	876.1	512.5
82.00	68.41	69.00	6219.9	876.6	535.3
83.00	69.33	69.92	6303.4	877.1	558.7
84.00	70.25	70.85	6387.0	877.6	582.8
85.00	71.17	71.78	6470.6	878.1	607.6
86.00	72.09	72.70	6554.2	878.6	633.2
87.00	73.01	73.63	6637.8	879.1	659.4
88.00	73.93	74.56	6721.3	879.6	686.4
89.00	74.85	75.49	6804.9	880.1	714.1
90.00	75.76	76.41	6888.5	880.6	742.5
91.00	76.68	77.34	6972.1	881.1	771.7
92.00	77.60	78.27	7055.7	881.6	801.7
93.00	78.52	79.19	7139.3	882.1	832.4
94.00	79.44	80.12	7222.8	882.6	864.0
95.00	80.36	81.05	7306.4	883.1	896.3
96.00	81.28	81.97	7390.0	883.6	929.4
97.00	82.20	82.90	7473.6	884.1	963.3
98.00	83.12	83.83	7557.2	884.6	998.1
99.00	84.04	84.76	7640.7	885.1	1033.6
100.00	84.96	85.68	7724.3	885.6	1070.0
101.00	85.88	86.61	7807.9	886.1	1107.3
102.00	86.80	87.54	7891.5	886.6	1145.4
103.00	87.71	88.46	7975.1	887.1	1184.4
104.00	88.63	89.39	8058.7	887.6	1224.2
105.00	89.55	90.32	8142.2	888.1	1264.9
106.00	90.47	91.25	8225.8	888.6	1306.6
107.00	91.39	92.17	8309.4	889.1	1349.1
108.00	92.31	93.10	8393.0	889.6	1392.5
109.00	93.23	94.03	8476.6	890.1	1436.8
110.00	94.15	94.95	8560.1	890.6	1482.1
111.00	95.07	95.88	8643.7	891.1	1528.3

TABLE 4.1-1 (CONTINUED)

OXIDIZER STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
112.00	95.99	96.81	8727.3	891.6	1575.5
113.00	96.91	97.74	8810.9	892.1	1623.6
114.00	97.83	98.66	8894.5	892.6	1672.7
115.00	98.75	99.59	8978.0	893.1	1722.7
116.00	99.67	100.52	9061.6	893.6	1773.8
117.00	100.58	101.44	9145.2	894.1	1825.8
118.00	101.50	102.37	9228.8	894.6	1878.8
119.00	102.42	103.30	9312.4	895.1	1932.9
120.00	103.34	104.23	9396.0	895.6	1988.0
121.00	104.26	105.15	9479.5	896.1	2044.0
122.00	105.18	106.08	9563.1	896.6	2101.2
123.00	106.10	107.01	9646.7	897.1	2159.4
124.00	107.02	107.93	9730.3	897.6	2218.6
125.00	107.94	108.86	9813.9	898.1	2278.9
126.00	108.86	109.79	9897.4	898.6	2340.3
127.00	109.78	110.72	9981.0	899.1	2402.7
128.00	110.70	111.64	10064.6	899.6	2466.3
129.00	111.62	112.57	10148.2	900.1	2530.9
130.00	112.54	113.50	10231.8	900.6	2596.7
131.00	113.45	114.42	10315.4	901.1	2663.6
132.00	114.37	115.35	10398.9	901.6	2731.6
132.20	114.56	115.54	10415.7	901.7	2745.3
133.00	115.29	116.28	10482.5	902.1	2800.7
134.00	116.21	117.20	10565.8	902.6	2870.8
135.00	117.12	118.12	10648.5	903.1	2941.4
136.00	118.02	119.03	10730.2	903.6	3012.5
137.00	118.90	119.92	10810.7	904.1	3083.5
138.00	119.77	120.80	10889.7	904.6	3154.2
139.00	120.62	121.65	10966.7	905.0	3224.2
140.00	121.44	122.48	11041.4	905.5	3293.1
141.00	122.23	123.28	11113.6	905.9	3360.6
142.00	123.00	124.05	11182.9	906.3	3426.2
143.00	123.72	124.78	11248.9	906.7	3489.5
144.00	124.41	125.47	11311.4	907.1	3550.1
145.00	125.05	126.12	11369.9	907.5	3607.6
146.00	125.65	126.73	11424.3	907.8	3661.4
147.00	126.20	127.28	11474.0	908.1	3711.2

TABLE 4.1-1 (CONTINUED)

OXIDIZER STORAGE TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
148.00	126.69	127.78	11518.9	908.4	3756.5
149.00	127.13	128.22	11558.6	908.6	3796.8
150.00	127.50	128.59	11592.7	908.9	3831.7
151.00	127.81	128.91	11620.9	909.0	3860.7
152.00	128.06	129.15	11642.9	909.2	3883.4
153.00	128.23	129.32	11658.3	909.3	3899.4
154.00	128.32	129.42	11666.9	909.3	3908.3
154.70	128.34	129.44	11668.6	909.3	3910.1

TABLE 4.1-1 (CONTINUED)

OXIDIZER SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
4.00	5.02	5.02	452.5	860.5	19.3
5.00	5.31	5.31	479.0	859.1	20.1
6.00	5.67	5.68	512.3	857.7	20.5
7.00	6.11	6.12	552.1	856.3	20.8
8.00	6.61	6.63	598.0	855.0	21.0
9.00	7.18	7.21	649.6	853.9	21.4
10.00	7.81	7.84	706.7	852.9	21.8
11.00	8.49	8.53	768.9	852.0	22.1
12.00	9.23	9.27	836.0	851.3	22.4
13.00	10.01	10.07	907.4	850.8	23.0
14.00	10.85	10.91	983.1	850.4	23.5
15.00	11.72	11.79	1062.5	850.1	24.0
16.00	12.63	12.71	1145.4	849.9	24.4
17.00	13.57	13.66	1231.4	849.8	25.1
18.00	14.55	14.65	1320.2	849.8	25.6
19.00	15.56	15.66	1411.6	849.8	25.9
20.00	16.58	16.70	1505.0	849.9	26.1
21.00	17.63	17.75	1600.3	850.1	26.4
22.00	18.69	18.83	1697.1	850.2	26.8
23.00	19.77	19.91	1795.0	850.5	27.1
24.00	20.86	21.01	1893.8	850.7	27.5
25.00	21.95	22.11	1993.0	851.0	27.9
25.50	22.49	22.66	2042.7	851.2	28.2
26.00	23.04	23.21	2092.3	851.3	28.4
27.00	24.13	24.31	2191.6	851.6	28.6
28.00	25.22	25.41	2290.8	852.0	28.8
29.00	26.31	26.51	2390.1	852.3	29.0
30.00	27.41	27.61	2489.3	852.7	29.3
31.00	28.50	28.71	2588.5	853.1	29.8
32.00	29.59	29.82	2687.8	853.5	30.3
33.00	30.68	30.92	2787.0	853.8	31.9
34.00	31.77	32.02	2886.3	854.2	31.6
35.00	32.86	33.12	2985.5	854.7	32.1
36.00	33.96	34.22	3084.8	855.1	32.9
37.00	35.05	35.32	3184.0	855.5	33.9
38.00	36.14	36.42	3283.2	855.9	34.3
39.00	37.23	37.52	3382.5	856.3	35.2

TABLE 4.1-1 (CONTINUED)

OXIDIZER SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
40.00	38.32	38.62	3481.7	856.8	36.7
41.00	39.41	39.72	3581.0	857.2	38.7
42.00	40.51	40.82	3680.2	857.6	41.2
43.00	41.60	41.92	3779.4	858.1	44.2
44.00	42.69	43.03	3878.7	858.5	47.7
45.00	43.78	44.13	3977.9	859.0	51.6
46.00	44.87	45.23	4077.2	859.4	56.0
47.00	45.96	46.33	4176.4	859.9	60.8
48.00	47.06	47.43	4275.7	860.3	66.1
49.00	48.15	48.53	4374.9	860.8	71.9
50.00	49.24	49.63	4474.1	861.2	78.1
51.00	50.33	50.73	4573.4	861.7	84.9
52.00	51.42	51.83	4672.6	862.2	92.0
53.00	52.51	52.93	4771.9	862.6	99.7
54.00	53.61	54.03	4871.1	863.1	107.9
55.00	54.70	55.13	4970.3	863.6	116.6
56.00	55.79	56.24	5069.6	864.0	125.8
57.00	56.88	57.34	5168.8	864.5	135.5
58.00	57.97	58.44	5268.1	865.0	145.7
58.02	57.99	58.46	5270.1	865.0	146.0
59.00	59.15	59.62	5375.0	865.5	160.9
60.00	60.33	60.81	5482.0	866.0	172.5
61.00	61.50	62.00	5589.0	866.5	184.8
62.00	62.68	63.18	5696.1	867.0	197.7
63.00	63.86	64.37	5803.1	867.5	211.2
64.00	65.04	65.56	5910.1	868.0	225.3
65.00	66.21	66.75	6017.2	868.5	240.0
66.00	67.39	67.93	6124.2	869.0	255.4
67.00	68.57	69.12	6231.3	869.5	271.5
68.00	69.75	70.31	6338.3	870.0	288.2
69.00	70.92	71.50	6445.3	870.5	305.6
70.00	72.10	72.68	6552.4	871.0	323.8
71.00	73.28	73.87	6659.4	871.5	342.6
72.00	74.46	75.06	6766.5	872.0	362.2
73.00	75.63	76.25	6873.5	872.6	382.5
74.00	76.81	77.43	6980.5	873.1	403.5
75.00	77.99	78.62	7087.6	873.6	425.4

TABLE 4.1-1 (CONTINUED)

OXIDIZER SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
76.00	79.16	79.81	7194.6	874.1	448.0
77.00	80.34	81.00	7301.7	874.6	471.4
78.00	81.52	82.18	7408.7	875.1	495.6
79.00	82.70	83.37	7515.7	875.6	520.6
80.00	83.87	84.56	7622.8	876.1	546.4
81.00	85.05	85.74	7729.8	876.6	573.1
82.00	86.23	86.93	7836.9	877.1	600.6
83.00	87.41	88.12	7943.9	877.6	629.0
84.00	88.58	89.31	8050.9	878.1	658.3
85.00	89.76	90.49	8158.0	878.6	688.4
86.00	90.94	91.68	8265.0	879.1	719.5
87.00	92.12	92.87	8372.0	879.6	751.4
88.00	93.29	94.06	8479.1	880.1	784.3
89.00	94.47	95.24	8586.1	880.6	818.2
90.00	95.65	96.43	8693.2	881.1	853.0
91.00	96.83	97.62	8800.2	881.6	888.7
92.00	98.00	98.81	8907.2	882.1	925.4
93.00	99.18	99.99	9014.3	882.6	963.1
94.00	100.36	101.18	9121.3	883.1	1001.8
95.00	101.54	102.37	9228.4	883.6	1041.5
96.00	102.71	103.55	9335.4	884.1	1082.3
97.00	103.89	104.74	9442.4	884.6	1124.0
98.00	105.07	105.93	9549.5	885.1	1166.8
99.00	106.25	107.12	9656.5	885.6	1210.7
100.00	107.42	108.30	9763.6	886.1	1255.7
101.00	108.60	109.49	9870.6	886.6	1301.7
102.00	109.78	110.68	9977.6	887.1	1348.8
103.00	110.96	111.87	10084.7	887.6	1397.0
104.00	112.13	113.05	10191.7	888.1	1446.4
105.00	113.31	114.24	10298.8	888.7	1496.8
106.00	114.49	115.43	10405.8	889.2	1548.5
107.00	115.67	116.62	10512.8	889.7	1601.2
108.00	116.84	117.80	10619.9	890.2	1655.2
109.00	118.02	118.99	10726.9	890.7	1710.3
110.00	119.20	120.18	10833.9	891.2	1766.6
111.00	120.38	121.36	10941.0	891.7	1824.1
112.00	121.55	122.55	11048.0	892.2	1882.8

TABLE 4.1-1 (CONTINUED)

OXIDIZER SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
113.00	122.73	123.74	11155.1	892.7	1942.7
114.00	123.91	124.93	11262.1	893.2	2003.9
115.00	125.09	126.11	11369.1	893.7	2066.4
116.00	126.26	127.30	11476.2	894.2	2130.0
117.00	127.44	128.49	11583.2	894.7	2195.0
118.00	128.62	129.68	11690.3	895.2	2261.3
119.00	129.79	130.86	11797.3	895.7	2328.8
120.00	130.97	132.05	11904.3	896.2	2397.7
121.00	132.15	133.24	12011.4	896.7	2467.8
122.00	133.33	134.43	12118.4	897.2	2539.3
123.00	134.50	135.61	12225.5	897.7	2612.2
124.00	135.68	136.80	12332.5	898.2	2686.4
125.00	136.86	137.99	12439.5	898.7	2762.0
126.00	138.04	139.17	12546.6	899.2	2838.9
127.00	139.21	140.36	12653.6	899.7	2917.2
128.00	140.39	141.55	12760.6	900.2	2997.0
128.30	140.75	141.91	12792.8	900.3	3021.2
129.00	141.57	142.74	12867.7	900.7	3078.1
130.00	142.74	143.92	12974.5	901.2	3160.5
131.00	143.91	145.10	13080.7	901.7	3243.9
132.00	145.07	146.27	13186.0	902.2	3328.0
132.90	146.10	147.31	13279.8	902.6	3404.0
133.00	146.22	147.42	13290.2	902.7	3412.5
134.00	147.35	148.56	13393.1	903.2	3497.4
135.00	148.46	149.69	13494.1	903.6	3582.1
136.00	149.55	150.78	13593.0	904.1	3666.2
137.00	150.61	151.85	13689.2	904.6	3749.4
138.00	151.63	152.89	13782.7	905.0	3831.3
139.00	152.63	153.89	13872.9	905.4	3911.4
140.00	153.58	154.85	13959.5	905.8	3989.5
141.00	154.49	155.77	14042.3	906.2	4065.0
142.00	155.36	156.64	14120.9	906.6	4137.6
143.00	156.17	157.46	14195.0	907.0	4206.7
144.00	156.93	158.23	14264.2	907.3	4272.0
145.00	157.64	158.94	14328.2	907.6	4333.0
146.00	158.28	159.59	14386.7	907.9	4389.2
147.00	158.86	160.17	14439.4	908.1	4440.2

TABLE 4.1-1 (CONTINUED)

OXIDIZER SUMP TANK

HEIGHT OF PROPELLANT	TANK VOLUME UNSTRECHED	TANK VOLUME STRECHED	MASS OF PROPELLANT	CENTER OF MASS	MOMENT OF INERTIA(IYY)
148.00	159.37	160.69	14485.8	908.4	4485.5
149.00	159.81	161.13	14525.8	908.6	4524.7
150.00	160.17	161.50	14558.9	908.7	4557.4
151.00	160.46	161.78	14584.9	908.9	4583.1
152.00	160.66	161.99	14603.3	909.0	4601.4
153.00	160.78	162.11	14613.9	909.0	4612.0
153.80	160.81	162.14	14616.5	909.0	4614.6

TABLE 4.1-2

TRAPPED SPS MASS PROPERTIES

	Weight Pounds	Center of Gravity Inches X_A	Y_A	Z_A
SERVICE MODULE				
[1] SPS - Trapped Outside Tanks				
Engine - Fuel	29.6	846.9	6.6	0.4
- Oxidizer	47.4	843.0	-7.1	1.6
Feedline - Fuel	29.5	832.0	-48.0	-25.0
- Oxidizer	44.7	832.0	48.0	25.0
Transfer Line - Fuel	19.5	829.0	-27.0	-24.0
- Oxidizer	31.6	829.0	27.0	24.0
Total Outside Tanks	202.3	836.0	4.5	3.7
[2] Trapped in Tanks				
Retention Reservoir - Fuel	61.4			
- Oxidizer	97.5			
Vapor - Fuel	6.2			
- Oxidizer	74.0			
Total Inside Tanks	239.1			

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[1] SPS propellant trapped outside tanks should be subtracted from the total SPS propellant load for a particular mission to arrive at the tanked SPS propellant. This tanked amount is then used in the preceeding tables to arrive at the appropriate SPS propellant Mass Properties.

[2] The total SPS propellant load for a particular mission less trapped in tanks and outside tanks equals nominal deliverable SPS propellant.

TABLE 4.1-3

SPS Propellant Density Equations (S/C 107 and Subsequent)

Equations for calculating SPS fuel and oxidizer densities are given below. In order to calculate the density for fuel or oxidizer of a given load on a particular mission using the measured density furnished by KSC, the following steps are necessary:

A. Use the appropriate equation below and calculate the fuel or oxidizer density at the given pressure and temperature of the KSC sample. This will usually be 14.7 PSIA and 25°C for fuel, and 14.7 PSIA and 4°C for oxidizer.

B. Use the appropriate equation below and calculate the fuel or oxidizer density at the final system pressure and temperature. This will usually be 110±5 PSIA and 70±5°F.

C. Subtract the density obtained in step A from the measured density of the KSC sample, and add this amount (may be either positive or negative) to the density obtained from step B.

A-50 DENSITY EQUATION

$$\rho_F = [57.6095 - 0.058533(°C)](C_F)$$

where: ρ_F = A-50 density in lb/ft^3

$°C$ = Temperature in degrees centigrade

C_F = Compressibility factor - obtain this number from the pressure - compressibility graph on Figure 4.1-1 of this section.

N_2O_4 DENSITY EQUATION

$$\rho_O = [93.1048 - 0.14252(°C)](C_O)$$

where: ρ_O = N_2O_4 density in lb/ft

$°C$ = Temperature in degrees centigrade

C_O = Compressibility factor - obtain this number from the pressure - compressibility graph on Figure 4.1-2 of this section.

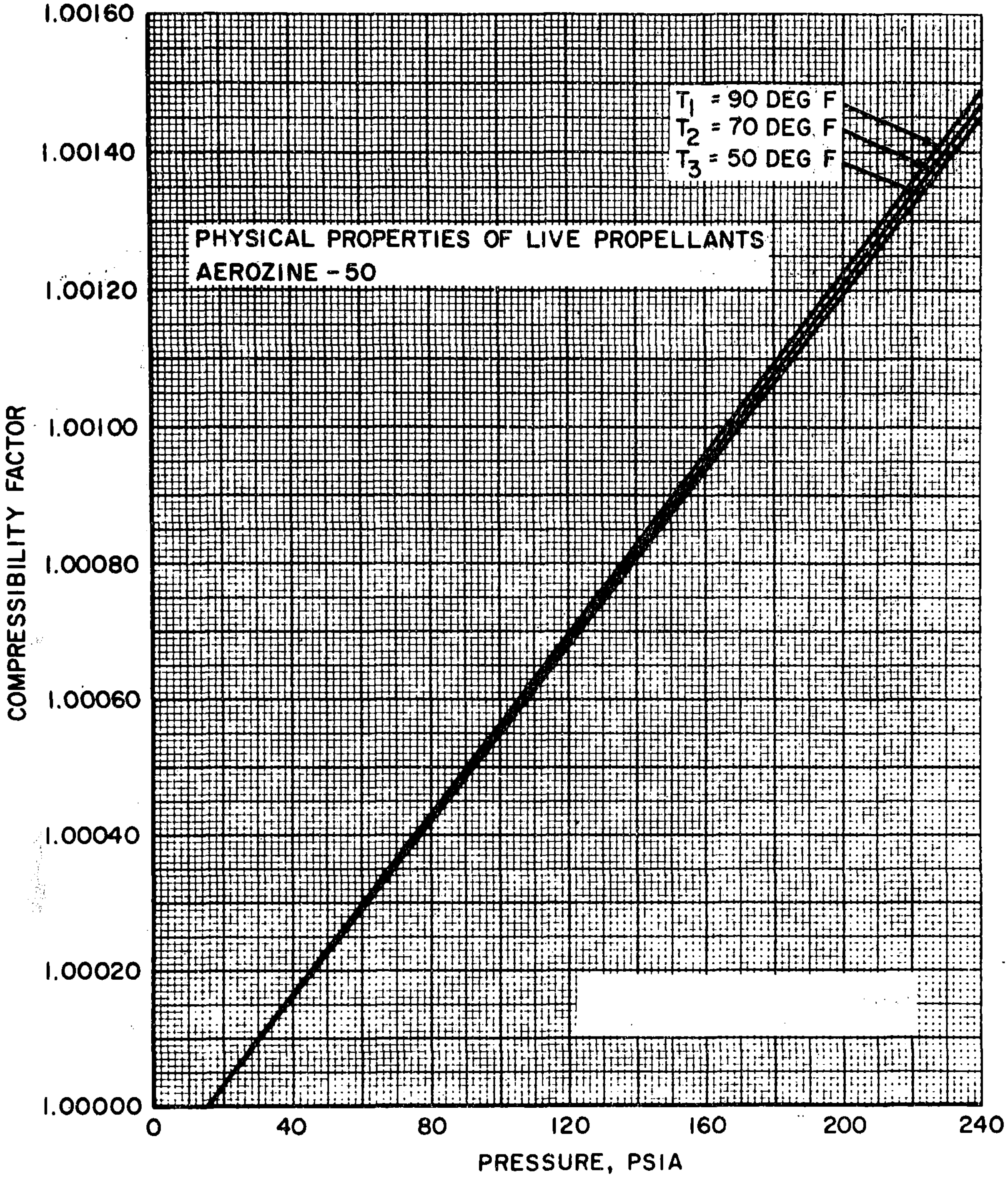

FIGURE 4.1-1. AEROZINE-50 COMPRESSIBILITY CORRECTION FACTOR

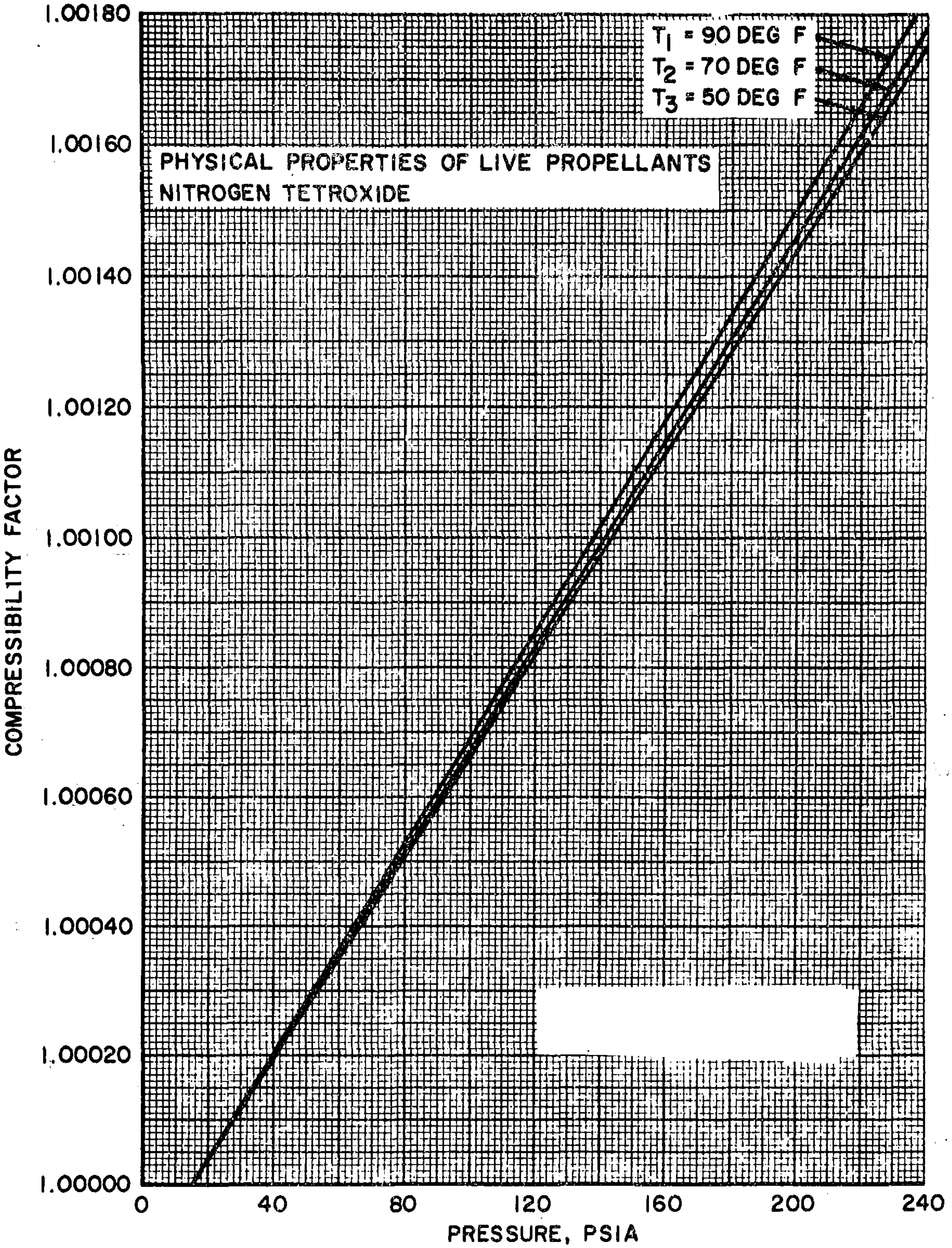

FIGURE 4.1-2. NITROGEN TETROXIDE COMPRESSIBILITY CORRECTION FACTOR

FUEL

FOR ULLAGE LOADING PRESSURE OF 110±4 PSIA

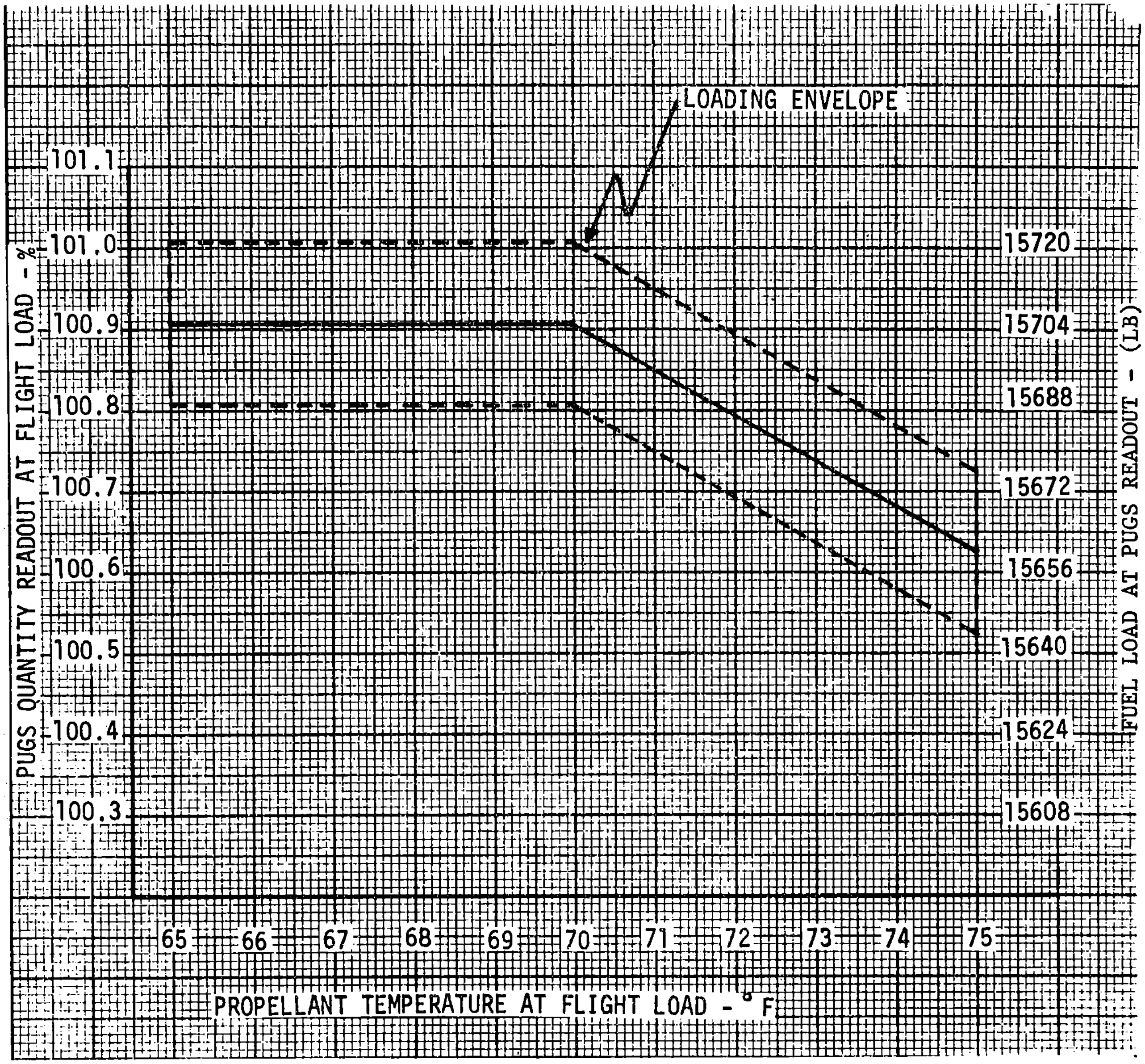

FIGURE 4.1-3. SERVICE MODULE SPS FUEL LOADING WINDOW FOR SM 107 AND SUBSEQUENT

FUEL

FOR ULLAGE LOADING PRESSURE OF 110±4 PSIA

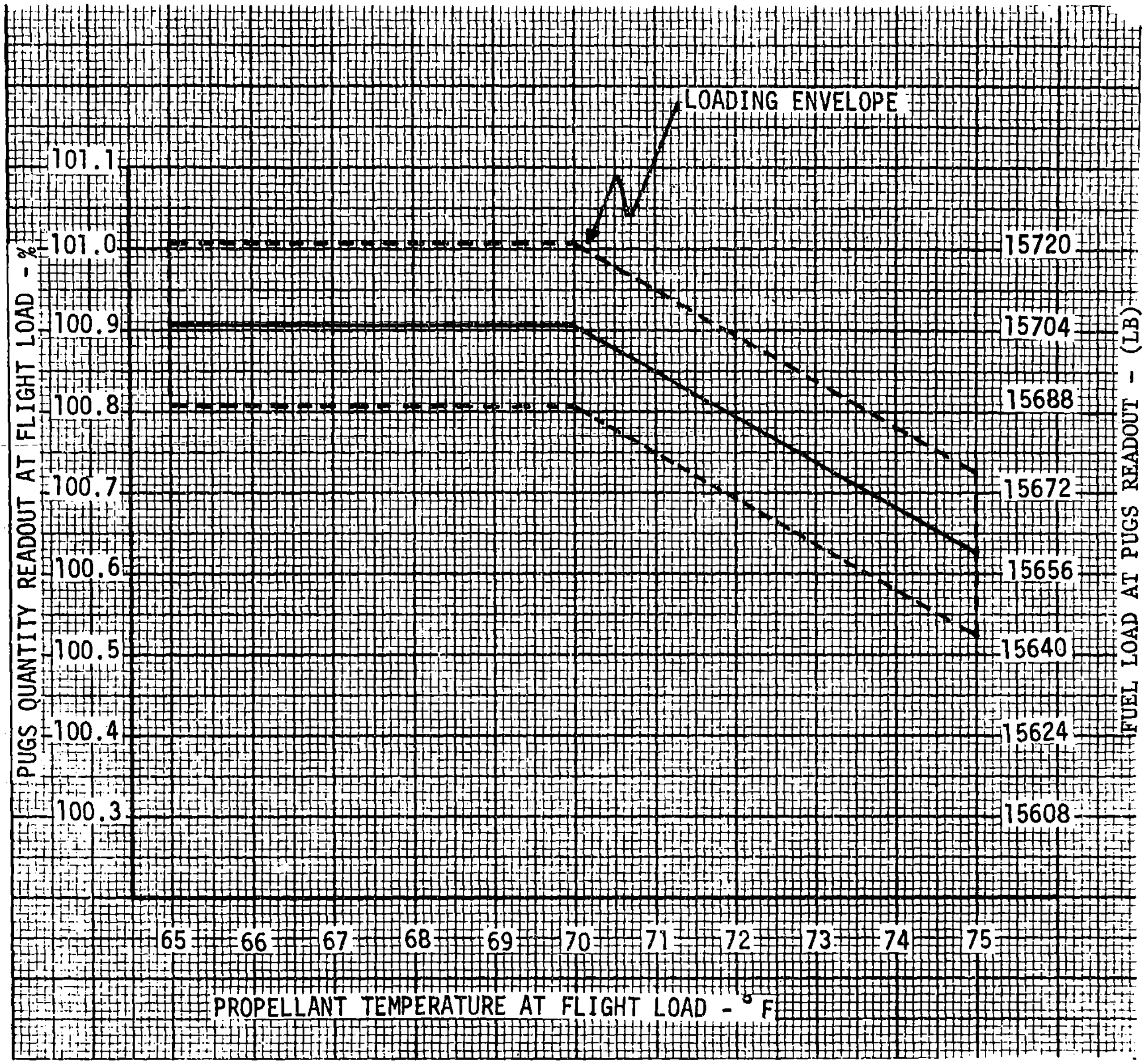

FIGURE 4.1-3. SERVICE MODULE SPS FUEL LOADING WINDOW FOR SM 107 AND SUBSEQUENT

OXIDIZER

FOR ULLAGE LOADING PRESSURE OF 110±4 PSIA

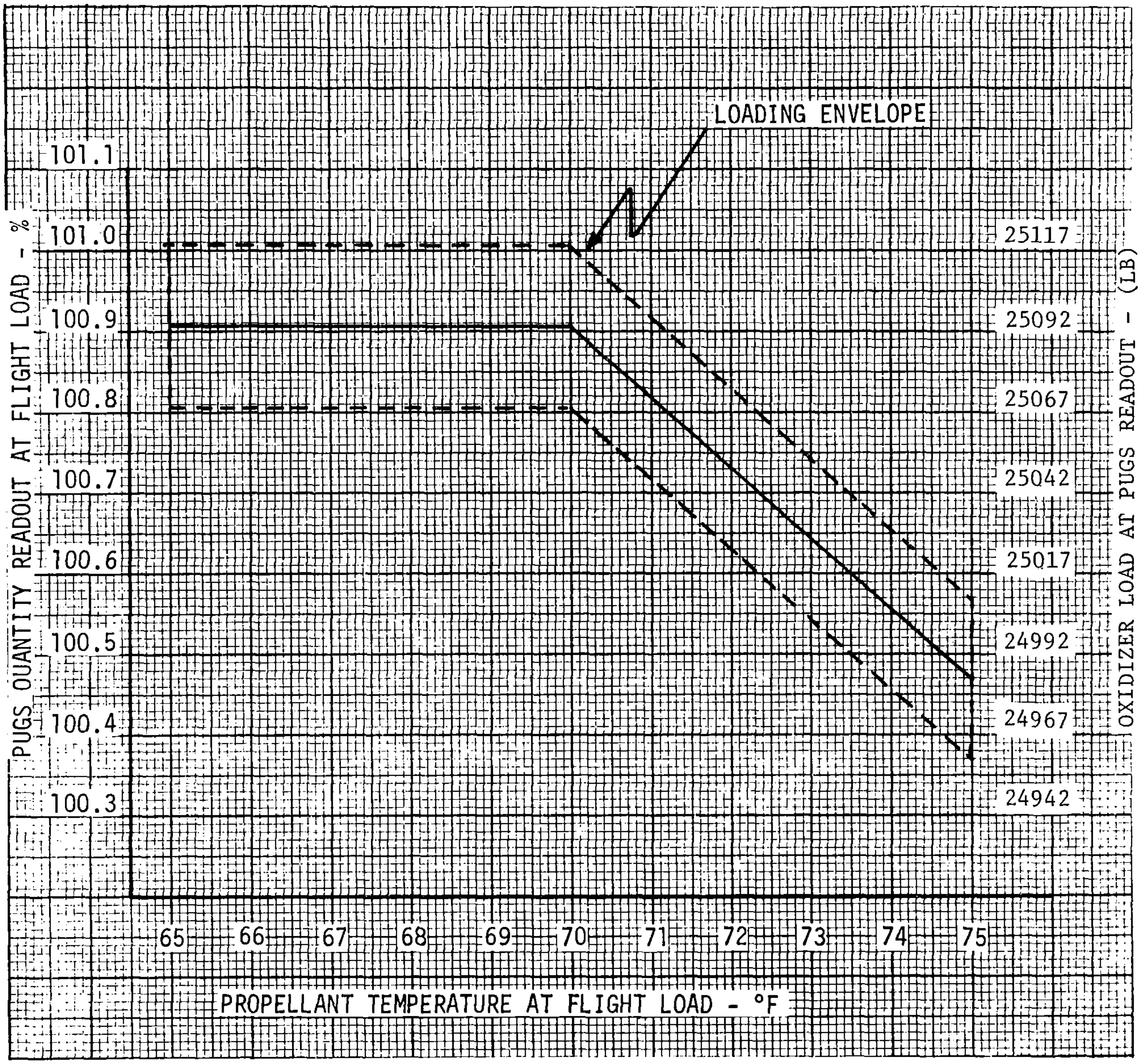

FIGURE 4.1-4. SERVICE MODULE SPS OXIDIZER LOADING WINDOW FOR SM 107 AND SUBSEQUENT

TABLE 4.2-1
CSM - CONSUMABLE LOADS AND UNCERTAINTIES

This table contains the consumable loads, associated tolerances, and/or uncertainties at nominal loading temperatures and pressures.

	WEIGHT POUNDS	(1) CENTER OF GRAVITY INCHES		
		X_A	Y_A	Z_A
COMMAND MODULE				
Nominal Load				
RCS (2)				
Loaded System 1 - Fuel	44.2±0.9	1022.6	-38.7	52.8
System 1 - Oxidizer	78.3±1.6	1022.6	26.6	59.8
System 2 - Fuel	44.2±0.9	1022.6	-52.8	38.7
System 2 - Oxidizer	78.3±1.6	1022.6	2.3	65.5
Loaded - Fuel	88.4±1.3	1022.6	-45.8	45.8
- Oxidizer	156.6±2.3	1022.6	14.5	62.7
Total Loaded	245.0±2.6	1022.6	-7.3	57.0
Maximum Trapped				
System 1 - Fuel	6.9	1022.6	-38.7	52.8
System 1 - Oxidizer	11.7	1022.6	26.6	59.8
System 2 - Fuel	6.4	1022.6	-52.8	38.7
System 2 - Oxidizer	11.4	1022.6	2.3	65.5
Trapped - Fuel	13.3	1022.6	-45.5	46.0
- Oxidizer	23.1	1022.6	14.6	62.6
Total Trapped (Maximum)	36.4	1022.6	-7.3	56.5
Deliverable (6)				
System 1 - Fuel	37.3±0.9	1022.6	-38.7	52.8
System 1 - Oxidizer	66.6±1.6	1022.6	26.6	59.8
System 2 - Fuel	37.8±0.9	1022.6	-52.8	38.7
System 2 - Oxidizer	66.9±1.6	1022.6	2.3	65.5
Deliverable - Fuel	75.1±1.3	1022.6	-45.8	45.7
- Oxidizer	133.5±2.3	1022.6	14.4	62.7
Total Deliverable	208.6±2.6	1022.6	-7.3	56.5

TABLE 4.2-1 (CONTINUED)

SERVICE MODULE - Nominal Load RCS(2)	Weight Pounds	(1)Center of Gravity Inches		
		X_A	Y_A	Z_A
Quad A - Loaded Primary - Fuel	69.9±0.8	964.8	8.0	-68.5
Secondary-Fuel	40.3±0.8	985.1	-7.0	-69.0
Oxidizer	225.4±3.4	926.9	8.0	-68.5
Quad B - Loaded Primary - Fuel	69.9±0.8	964.8	64.5	-26.5
Secondary-Fuel	40.3±0.8	985.1	68.0	-11.0
Oxidizer	225.4±3.4	926.9	64.5	-26.5
Quad C - Loaded Primary - Fuel	69.9±0.8	964.8	-8.0	68.5
Secondary-Fuel	40.3±0.8	985.1	7.0	69.0
Oxidizer	225.4±3.4	926.9	-8.0	68.5
Quad D - Loaded Primary - Fuel	69.9±0.8	964.8	-64.5	26.5
Secondary-Fuel	40.3±0.8	985.1	-68.0	11.0
Oxidizer	225.4±3.4	926.9	-64.5	26.5
Loaded Primary - Fuel	279.6±1.6	964.8	0.0	0.0
Secondary-Fuel	161.2±1.6	985.1	0.0	0.0
Oxidizer	901.6±6.8	926.9	0.0	0.0
Loaded - Fuel	440.8±2.3	972.9	0.0	0.0
-Oxidizer	901.6±6.8	926.9	0.0	0.0
TOTAL LOADED	1342.4±7.2	942.1	0.0	0.0
Max. Trapped--Quad A - Primary Fuel	1.4	964.8	8.0	-68.5
- Secondary Fuel	0.7	985.1	-7.0	-69.0
- Oxidizer	4.5	926.9	8.0	-68.5
Quad B - Primary Fuel	1.4	964.8	64.5	-26.5
- Secondary Fuel	0.7	985.1	68.0	-11.0
- Oxidizer	4.5	926.9	64.5	-26.5
Quad C - Primary Fuel	1.4	964.8	-8.0	68.5
- Secondary Fuel	0.7	985.1	7.0	69.0
- Oxidizer	4.5	926.9	-8.0	68.5
Quad D - Primary Fuel	1.4	964.8	-64.5	26.5
- Secondary Fuel	0.7	985.1	-68.0	11.0
- Oxidizer	4.5	926.9	-64.5	26.5
Trapped Primary Fuel	5.6	964.8	0.0	0.0
Secondary Fuel	2.8	985.1	0.0	0.0
Oxidizer	18.0	926.9	0.0	0.0
Trapped Fuel	8.4	971.6	0.0	0.0
Oxidizer	18.0	926.9	0.0	0.0
TOTAL TRAPPED (MAXIMUM)	26.4	940.9	0.0	0.0

TABLE 4.2-1 (CONTINUED)

	Weight Pounds	Center of Gravity Inches X_A	Y_A	Z_A
Deliverable (6)				
Quad A - Primary Fuel	68.5±0.8	964.8	8.0	-68.5
- Secondary Fuel	39.6±0.8	985.1	-7.0	-69.0
- Oxidizer	220.9±3.4	926.9	8.0	-68.5
Quad B - Primary Fuel	68.5±0.8	964.8	64.5	-26.5
- Secondary Fuel	39.6±0.8	985.1	68.0	-11.0
- Oxidizer	220.9±3.4	926.9	64.5	-26.5
Quad C - Primary Fuel	68.5±0.8	964.8	-8.0	68.5
- Secondary Fuel	39.6±0.8	985.1	7.0	69.0
- Oxidizer	220.9±3.4	926.9	-8.0	68.5
Quad D - Primary Fuel	68.5±0.8	964.8	-64.5	26.5
- Secondary Fuel	39.6±0.8	985.1	-68.0	11.0
- Oxidizer	220.9±3.4	926.9	-64.5	26.5
Deliverable Primary Fuel	274.0±1.6	964.8	0.0	0.0
Secondary Fuel	158.4±1.6	985.1	0.0	0.0
Oxidizer	883.6±6.8	926.9	0.0	0.0
Deliverable Fuel	432.4±2.3	972.9	0.0	0.0
Oxidizer	883.6±6.8	926.9	0.0	0.0
Total Deliverable (6)	1316.0±7.2	942.1	0.0	0.0

TABLE 4.2-1 (CONTINUED)

CSM 112 AND SUBSEQUENT MISCELLANEOUS CONSUMABLES

CSM MISCELLANEOUS CONSUMABLES	WEIGHT POUNDS	CENTER OF GRAVITY INCHES		
		X_A	Y_A	Z_A
CM/RCS - HELIUM	1.0	1022.6	-3.1	25.8
CM/ECS				
Oxygen - Entry	(7)	1031.1	-26.9	-34.2
Potable Water (3)	(7)	1022.6	-63.5	-16.4
Waste Water (4)	(7)	1022.6	-19.7	62.5
SM/RCS - Helium	6.0	983.9	0.0	0.0
SM/SPS Helium - Storage Bottles	87.6	954.7	0.0	0.0
- Tanks (5)	5.4	976.0	2.7	8.9
SM/Nitrogen	1.3	874.0	0.0	0.0
SM/EPS/ECS				
Oxygen - Hydrogen[1]				
H_2	29.3	974.6	37.0	-46.0
H_2	29.3	859.4	-40.7	41.2
H_2	29.3	892.9	-40.7	41.2
O_2	330.1	920.8	-20.9	26.9
O_2	330.1	920.8	-27.4	54.5
O_2	330.1	938.0	22.5	-30.0
Total - H_2	87.9	909.0	-14.8	12.1
- O_2	990.3	926.6	-8.6	17.1
Total on Board	1078.2	925.1	-9.1	16.7
Unusable - H_2	1.2	974.6	37.0	-46.0
- H_2	1.2	859.4	-40.7	41.2
- H_2	1.2	892.9	-40.7	41.2
- O_2	6.6	920.8	-20.9	26.9
- O_2	6.6	920.8	-27.4	54.5
- O_2	6.6	938.0	22.5	-30.0
Unusable - H_2	3.6	909.0	-14.8	12.1
- O_2	19.8	926.6	-8.6	17.1
Total Unusable	23.4	923.8	-9.6	16.4
Usable - H_2	28.1	974.6	37.0	-46.0
- H_2	28.1	859.4	-40.7	41.2
- H_2	28.1	892.9	-40.7	41.2
- O_2	323.5	920.8	-20.9	26.9
- O_2	323.5	920.8	-27.4	54.5
- O_2	323.5	938.0	22.5	-30.0
Usable - H_2	84.3	909.0	-14.8	12.1
- O_2	970.5	926.6	-8.6	17.1
Total Usable	1054.8	925.1	-9.1	16.7

[1] Nominal Loading. For Liftoff values see individual Mission Section.

TABLE 4.2-1 (CONTINUED)

NOTES: (1) Referenced to the Apollo Coordinate System.

(2) All RCS propellant weight uncertainties prior to loading are based on the maximum and minimum permissable load deviation for the nominal load at 70°F.

(3) Potable water tank nominal capacity is 40 pounds.

(4) Waste water tank nominal capacity is 60 pounds.

(5) Based on full SPS propellant load.

(6) Deliverable SM/RCS propellant is that amount which can be expelled from the tanks assuming nominal mixture ratio. For pre-mission budget planning the minimum guaranteed usable propellant equals deliverable, less 20.0 pounds loading uncertainty, and less 80 pounds gauging inaccuracy.

(7) See appropriate mission dependent section.

TABLE 4.2-2

SM RCS QUAD A MASS PROPERTIES

The following table presents the mass properties for SM RCS Quad A as a function of propellant remaining. For all weights Z-c.g. = -68.6 inches, IXX = 0.0, PXZ = PYZ = 0.0.

TOTAL WT. Pounds	X-c.g. Inches	Y-c.g. Inches	IYY Slug Ft^2	IZZ Slug Ft^2	PXY Slug Ft^2	PROPELLANT REMAINING (Pounds)			
						Pri. Fuel	Sec. Fuel	Pri. Oxidizer	Sec. Oxidizer
335.6	941.8	6.2	45.1	46.8	-5.7	69.9	40.3	140.4	85.0
326.6	941.9	6.2	44.0	45.7	-5.6	66.9	40.3	137.4	82.0
317.6	942.0	6.1	42.9	44.6	-5.6	63.9	40.3	134.4	79.0
308.6	942.2	6.0	41.9	43.6	-5.6	60.9	40.3	131.4	76.0
299.6	942.3	6.0	40.8	42.5	-5.6	57.9	40.3	128.4	73.0
290.6	942.5	5.9	39.7	41.4	-5.6	54.9	40.3	125.4	70.0
281.6	942.7	5.9	38.6	40.3	-5.5	51.9	40.3	122.4	67.0
272.6	942.9	5.8	37.5	39.2	-5.5	48.9	40.3	119.4	64.0
263.6	943.0	5.7	36.4	38.1	-5.5	45.9	40.3	116.4	61.0
254.6	943.3	5.6	35.3	37.0	-5.5	42.9	40.3	113.4	58.0
245.6	943.5	5.5	34.2	35.9	-5.4	39.9	40.3	110.4	55.0
236.6	943.7	5.5	33.1	34.7	-5.4	36.9	40.3	107.4	52.0
227.6	944.0	5.3	32.0	33.6	-5.4	33.9	40.3	104.4	49.0
218.6	944.3	5.2	30.9	32.5	-5.3	30.9	40.3	101.4	46.0
209.6	944.6	5.1	29.7	31.3	-5.3	27.9	40.3	98.4	43.0
200.6	944.9	5.0	28.6	30.2	-5.2	24.9	40.3	95.4	40.0
191.6	945.3	4.8	27.5	29.0	-5.2	21.9	40.3	92.4	37.0
182.6	945.7	4.7	26.3	27.8	-5.1	18.9	40.3	89.4	34.0
173.6	946.1	4.5	25.1	26.6	-5.1	15.9	40.3	86.4	31.0
164.6	946.6	4.3	23.9	25.4	-5.0	12.9	40.3	83.4	28.0
155.6	947.2	4.1	22.7	24.2	-4.9	9.9	40.3	80.4	25.0
146.6	947.8	3.9	21.5	22.9	-4.9	6.9	40.3	77.4	22.0
137.6	948.5	3.6	20.2	21.6	-4.8	3.9	40.3	74.4	19.0
130.1	949.1	3.4	19.1	20.5	-4.7	1.4	40.3	71.9	16.5
121.1	949.5	3.4	17.1	18.4	-4.3	1.4	37.3	68.9	13.5
112.1	950.0	3.4	15.1	16.3	-3.9	1.4	34.3	65.9	10.5
103.1	950.5	3.5	13.1	14.2	-3.5	1.4	31.3	62.9	7.5
86.6	951.8	3.5	9.4	10.3	-2.8	1.4	25.8	57.4	2.0
77.6	951.6	3.6	8.4	9.2	-2.5	1.4	22.8	51.4	2.0
68.6	951.3	3.7	7.5	8.1	-2.2	1.4	19.8	45.4	2.0
59.6	950.9	3.8	6.5	7.1	-1.9	1.4	16.8	39.4	2.0
50.6	950.4	3.9	5.5	6.0	-1.5	1.4	13.8	33.4	2.0
41.6	949.7	4.1	4.5	4.9	-1.2	1.4	10.8	27.4	2.0
32.6	948.6	4.4	3.5	3.8	- .9	1.4	7.8	21.4	2.0
23.6	946.7	5.0	2.5	2.7	- .6	1.4	4.8	15.4	2.0
11.3	939.0	7.1	0.9	1.0	- .1	1.4	0.7	7.2	2.0

TABLE 4.2-2 (CONTINUED)

SM RCS QUAD B MASS PROPERTIES

The following table presents the mass properties for SM RCS Quad B as a function of propellant remaining. For all weights Y-c.g. = 64.9 inches, IXX = 0.0, PXY = PYZ = 0.0.

TOTAL WT. Pounds	X-c.g. Inches	Z-c.g. Inches	IYY Slug Ft^2	IZZ Slug Ft^2	PXZ Slug Ft^2	PROPELLANT REMAINING (Pounds) Pri. Fuel	Sec. Fuel	Pri. Oxidizer	Sec. Oxidizer
335.6	941.8	-24.6	46.9	45.2	5.8	69.9	40.3	140.4	85.0
326.6	941.9	-24.6	45.8	44.1	5.8	66.9	40.3	137.4	82.0
317.6	942.0	-24.5	44.8	43.0	5.8	63.9	40.3	134.4	79.0
308.6	942.2	-24.5	43.7	41.9	5.8	60.9	40.3	131.4	76.0
299.6	942.3	-24.4	42.6	40.9	5.8	57.9	40.3	128.4	73.0
290.6	942.5	-24.4	41.5	39.8	5.7	54.9	40.3	125.4	70.0
281.6	942.7	-24.3	40.4	38.7	5.7	51.9	40.3	122.4	67.0
272.6	942.9	-24.2	39.3	37.6	5.7	48.9	40.3	119.4	64.0
263.6	943.0	-24.1	38.2	36.5	5.7	45.9	40.3	116.4	61.0
254.6	943.3	-24.1	37.1	35.4	5.6	42.9	40.3	113.4	58.0
245.6	943.5	-24.0	36.0	34.3	5.6	39.9	40.3	110.4	55.0
236.6	943.7	-23.9	34.8	33.2	5.6	36.9	40.3	107.4	52.0
227.6	944.0	-23.8	33.7	32.1	5.5	33.9	40.3	104.4	49.0
218.6	944.3	-23.6	32.6	31.0	5.5	30.9	40.3	101.4	46.0
209.6	944.6	-23.5	31.4	29.8	5.5	27.9	40.3	98.4	43.0
200.6	944.9	-23.4	30.3	28.7	5.4	24.9	40.3	95.4	40.0
191.6	945.3	-23.2	29.1	27.5	5.4	21.9	40.3	92.4	37.0
182.6	945.7	-23.1	27.9	26.4	5.3	18.9	40.3	89.4	34.0
173.6	946.1	-22.9	26.7	25.2	5.3	15.9	40.3	86.4	31.0
164.6	946.6	-22.7	25.5	24.0	5.2	12.9	40.3	83.4	28.0
155.6	947.2	-22.5	24.3	22.8	5.1	9.9	40.3	80.4	25.0
146.6	947.8	-22.2	23.0	21.5	5.0	6.9	40.3	77.4	22.0
137.6	948.5	-22.0	21.7	20.3	4.9	3.9	40.3	74.4	19.0
130.1	949.1	-21.7	20.6	19.2	4.8	1.4	40.3	71.9	16.5
121.1	949.5	-21.7	18.5	17.2	4.4	1.4	37.3	68.9	13.5
112.1	950.0	-21.8	16.4	15.2	4.0	1.4	34.3	65.9	10.5
103.1	950.5	-21.8	14.3	13.2	3.6	1.4	31.3	62.9	7.5
86.6	951.8	-21.9	10.3	9.4	2.9	1.4	25.8	57.4	2.0
77.6	951.6	-22.0	9.3	8.5	2.6	1.4	22.8	51.4	2.0
68.6	951.3	-22.0	8.2	7.5	2.2	1.4	19.8	45.4	2.0
59.6	950.9	-22.1	7.1	6.5	1.9	1.4	16.8	39.4	2.0
50.6	950.4	-22.3	6.0	5.5	1.6	1.4	13.8	33.4	2.0
41.6	949.7	-22.5	4.9	4.6	1.3	1.4	10.8	27.4	2.0
32.6	948.6	-22.8	3.8	3.6	1.0	1.4	7.8	21.4	2.0
23.6	946.7	-23.4	2.7	2.5	0.6	1.4	4.8	15.4	2.0
11.3	939.0	-25.5	1.0	0.9	0.1	1.4	0.7	7.2	2.0

TABLE 4.2-2 (CONTINUED)

SM RCS QUAD C MASS PROPERTIES

The following table presents the mass properties for SM RCS Quad C as a function of propellant remaining. For all weights Z-c.g. = 68.6 inches, IXX = 0.0, PXZ = PYZ = 0.0.

TOTAL WT. Pounds	X-c.g. Inches	Y-c.g. Inches	IYY Slug Ft^2	IZZ Slug Ft^2	PXY Slug Ft^2	PROPELLANT REMAINING (Pounds)			
						Pri. Fuel	Sec. Fuel	Pri. Oxidizer	Sec. Oxidizer
335.6	941.8	-6.2	45.1	46.8	5.7	69.9	40.3	140.4	85.0
326.6	941.9	-6.2	44.0	45.7	5.6	66.9	40.3	137.4	82.0
317.6	942.0	-6.1	42.9	44.6	5.6	63.9	40.3	134.4	79.0
308.6	942.2	-6.0	41.9	43.6	5.6	60.9	40.3	131.4	76.0
299.6	942.3	-6.0	40.8	42.5	5.6	57.9	40.3	128.4	73.0
290.6	942.5	-5.9	39.7	41.4	5.6	54.9	40.3	125.4	70.0
281.6	942.7	-5.9	38.6	40.3	5.5	51.9	40.3	122.4	67.0
272.6	942.9	-5.8	37.5	39.2	5.5	48.9	40.3	119.4	64.0
263.6	943.0	-5.7	36.4	38.1	5.5	45.9	40.3	116.4	61.0
254.6	943.3	-5.6	35.3	37.0	5.5	42.9	40.3	113.4	58.0
245.6	943.5	-5.5	34.2	35.9	5.4	39.9	40.3	110.4	55.0
236.6	943.7	-5.5	33.1	34.7	5.4	36.9	40.3	107.4	52.0
227.6	944.0	-5.3	32.0	33.6	5.4	33.9	40.3	104.4	49.0
218.6	944.3	-5.2	30.9	32.5	5.3	30.9	40.3	101.4	46.0
209.6	944.6	-5.1	29.7	31.3	5.3	27.9	40.3	98.4	43.0
200.6	944.9	-5.0	28.6	30.2	5.2	24.9	40.3	95.4	40.0
191.6	945.3	-4.9	27.5	29.0	5.2	21.9	40.3	92.4	37.0
182.6	945.7	-4.7	26.3	27.8	5.1	18.9	40.3	89.4	34.0
173.6	946.1	-4.5	25.1	26.6	5.1	15.9	40.3	86.4	31.0
164.6	946.6	-4.3	23.9	25.4	5.0	12.9	40.3	83.4	28.0
155.6	947.2	-4.1	22.7	24.2	4.9	9.9	40.3	80.4	25.0
146.6	947.8	-3.9	21.5	22.9	4.9	6.9	40.3	77.4	22.0
137.6	948.5	-3.6	20.2	21.6	4.8	3.9	40.3	74.4	19.0
130.1	949.1	-3.4	19.1	20.5	4.7	1.4	40.3	71.9	16.5
121.1	949.5	-3.4	17.1	18.4	4.3	1.4	37.3	68.9	13.5
112.1	950.0	-3.4	15.1	16.3	3.9	1.4	34.3	65.9	10.5
103.1	950.5	-3.5	13.1	14.2	3.5	1.4	31.3	62.9	7.5
86.6	951.8	-3.5	9.4	10.3	2.8	1.4	25.8	57.4	2.0
77.6	951.6	-3.6	8.4	9.2	2.5	1.4	22.8	51.4	2.0
68.6	951.3	-3.7	7.5	8.1	2.2	1.4	19.8	45.4	2.0
59.6	950.9	-3.8	6.5	7.1	1.9	1.4	16.8	39.4	2.0
50.6	950.4	-3.9	5.5	6.0	1.5	1.4	13.8	33.4	2.0
41.6	949.7	-4.1	4.5	4.9	1.2	1.4	10.8	27.4	2.0
32.6	948.6	-4.4	3.5	3.8	0.9	1.4	7.8	21.4	2.0
23.6	946.7	-5.0	2.5	2.7	0.6	1.4	4.8	15.4	2.0
11.3	939.0	-7.1	0.9	1.0	0.1	1.4	0.7	7.2	2.0

TABLE 4.2-2 (CONTINUED)

SM RCS QUAD D MASS PROPERTIES

The following table presents the mass properties for SM RCS Quad D as a function of propellant remaining. For all weights Y-c.g. = -64.9 inches IXX = 0.0, PXY = PYZ = 0.0.

TOTAL WT. Pounds	X-c.g. Inches	Z-c.g. Inches	IYY Slug Ft^2	IZZ Slug Ft^2	PXZ Slug Ft^2	PROPELLANT REMAINING (Pounds)			
						Pri. Fuel	Sec. Fuel	Pri. Oxidizer	Sec. Oxidizer
335.6	941.8	24.6	46.9	45.2	-5.8	69.9	40.3	140.4	85.0
326.6	941.9	24.6	45.8	44.1	-5.8	66.9	40.3	137.4	82.0
317.6	942.0	24.5	44.8	43.0	-5.8	63.9	40.3	134.4	79.0
308.6	942.2	24.5	43.7	41.9	-5.8	60.9	40.3	131.4	76.0
299.6	942.3	24.4	42.6	40.9	-5.8	57.9	40.3	128.4	73.0
290.6	942.5	24.4	41.5	39.8	-5.7	54.9	40.3	125.4	70.0
281.6	942.7	24.3	40.4	38.7	-5.7	51.9	40.3	122.4	67.0
272.6	942.9	24.2	39.3	37.6	-5.7	48.9	40.3	119.4	64.0
263.6	943.0	24.1	38.2	36.5	-5.7	45.9	40.3	116.4	61.0
254.6	943.3	24.1	37.1	35.4	-5.6	42.9	40.3	113.4	58.0
245.6	943.5	24.0	36.0	34.3	-5.6	39.9	40.3	110.4	55.0
236.6	943.7	23.9	34.8	33.2	-5.6	36.9	40.3	107.4	52.0
227.6	944.0	23.8	33.7	32.1	-5.5	33.9	40.3	104.4	49.0
218.6	944.3	23.6	32.6	31.0	-5.5	30.9	40.3	101.4	46.0
209.6	944.6	23.5	31.4	29.8	-5.5	27.9	40.3	98.4	43.0
200.6	944.9	23.4	30.3	28.7	-5.4	24.9	40.3	95.4	40.0
191.6	945.3	23.2	29.1	27.5	-5.4	21.9	40.3	92.4	37.0
182.6	945.7	23.1	27.9	26.4	-5.3	18.9	40.3	89.4	34.0
173.6	946.1	22.9	26.7	25.2	-5.3	15.9	40.3	86.4	31.0
164.6	946.6	22.7	25.5	24.0	-5.2	12.9	40.3	83.4	28.0
155.6	947.2	22.5	24.3	22.8	-5.1	9.9	40.3	80.4	25.0
146.6	947.8	22.2	23.0	21.5	-5.0	6.9	40.3	77.4	22.0
137.6	948.5	22.0	21.7	20.3	-4.9	3.9	40.3	74.4	19.0
130.1	949.1	21.7	20.6	19.2	-4.8	1.4	40.3	71.9	16.5
121.1	949.5	21.7	18.5	17.2	-4.4	1.4	37.3	68.9	13.5
112.1	950.0	21.8	16.4	15.2	-4.0	1.4	34.3	65.9	10.5
103.1	950.5	21.8	14.3	13.2	-3.6	1.4	31.3	62.9	7.5
86.6	951.8	21.9	10.3	9.4	-2.9	1.4	25.8	57.4	2.0
77.6	951.6	22.0	9.3	8.5	-2.6	1.4	22.8	51.4	2.0
68.6	951.3	22.0	8.2	7.5	-2.2	1.4	19.8	45.4	2.0
59.6	950.9	22.1	7.1	6.5	-1.9	1.4	16.8	39.4	2.0
50.6	950.4	22.3	6.0	5.5	-1.6	1.4	13.8	33.4	2.0
41.6	949.7	22.5	4.9	4.6	-1.3	1.4	10.8	27.4	2.0
32.6	948.6	22.8	3.8	3.6	-1.0	1.4	7.8	21.4	2.0
23.6	946.7	23.4	2.7	2.5	-0.6	1.4	4.8	15.4	2.0
11.3	939.0	25.5	1.0	0.9	-0.1	1.4	0.7	7.2	2.0

4.3 CM/RCS AND SM/RCS LOAD CALCULATION TABLES AND LOADING WINDOWS

4.3.1 CM/RCS

Table 4.3-1 is the CM/RCS load calculation table to be completed by KSC for each mission. Figures 4.3-4 and 4.3-5 are the CM/RCS fuel and oxidizer loading windows to be used by KSC for Mission F and subsequent.

4.3.2 SM/RCS

Table 4.3-2 is the SM/RCS load summary table to be completed by KSC for each mission. Tables 4.3-3 through 4.3-6 are the load calculation tables to be used by KSC to transmit to MSC the PV parameters and calculations for each quad. All of these tables are mission independent. Figures 4.3-1 through 4.3-3 are the SM/RCS loading windows to be used by KSC for Mission F and subsequent.

4.3.3 CSM/RCS Mass Calculations for Horizontal Tanks

The primary method for determining the amount of RCS propellant loaded in the CSM horizontal tanks is by actual propellant weight as determined by using the bleed unit scales. The weight as determined by the bleed unit scales is verified by PV calculation as outlined in Tables 4.3-1, and 4.3-3 through 4.3-6. If for an individual tank the propellant weight as determined by the bleed unit scales and the propellant weight as determined by the PV calculation do not correlate, then KSC, ASPO, and the appropriate sub-system manager will jointly determine which of the above methods will be used.

TABLE 4.3-1

COMMAND MODULE RCS LOADING REQUIREMENTS, PARAMETERS AND CALCULATIONS

	Load Parameters and Calculations			
	Fuel		Oxidizer	
	Tank A	Tank B	Tank A	Tank B
A. Tank Volume @ 0.0 PSIG (in^3)				
A1. Liquid Line Volume (in^3)				
A2. Total A + A1 (in^3)				
B. Initial Weight in Bleed Unit Prior to Loading (lb)				
C. Final Weight in Bleed Unit After Loading (lb)				
D. Propellant Load by Weigh Tank; Item B less Item C (lb)				
E. Loading Temperature (°F)				
F. Specification Load @ 70 ±5°F (lb)				
G. Total CM/RCS Propellant Load from Item D above or Item P below (lb)		±0.3		±0.3
Ullage Calculation				
G1. Density (lb/in^3); solve the following equation where T = Temperature in E above and ρ_F = fuel density; ρ_O = oxidizer density. $\rho_F = 0.0329456 - (0.186979)(10^{-4})(T)$ $\rho_O = 0.451591(10^{-4})(11.8-T)+0.05475906$				
H. Specification Ullage @ E above; Maximum				
Minimum				
I. Tank Stretch Factor (in^3/PSI)				
J. Volume of GHE-GSE Line (in^3)				
K. Volume of S/C GHE Line (in^3)				
L. GSE Line Pressure (PSIG)				
M. Bladder Pressure (PSIG)				
N. Stabilized Equilibrium Pressure (PSIG)				
O. Ullage Volume (in^3); solve the following equation by substituting the values contained in the above indicated steps. $\text{Ullage Volume} = J\left(\frac{L-N}{N-M}\right) - I(N+M+14.7) - K$				
P. Propellant load by P.V. (lb)				

TABLE 4.3-2

SERVICE MODULE RCS PROPELLANT LOAD SUMMATION

Actual:

QUAD A
(Pounds)

Secondary Fuel ________

Primary Fuel ________

Total ________ ± 0.7

Total Oxidizer ________ ± 2.3

QUAD B
(Pounds)

Secondary Fuel ________

Primary Fuel ________

Total ________ ± 0.7

Total Oxidizer ________ ± 2.3

QUAD C
(Pounds)

Secondary Fuel ________

Primary Fuel ________

Total ________ ± 0.7

Total Oxidizer ________ ± 2.3

QUAD D
(Pounds)

Secondary Fuel ________

Primary Fuel ________

Total ________ ± 0.7

Total Oxidizer ________ ± 2.3

Total SM/RCS Propellant Loaded (lb)

Fuel ________ ± 1.4

Oxidizer ________ ± 4.6

TABLE 4.3-3

SERVICE MODULE RCS LOADING PARAMETERS AND CALCULATIONS - QUAD A

Fuel

Secondary Fuel

A. Loading Temperature (°F) __________

B. Tank Volume (in^3) @ 0.0 PSIG __________

B1. Liquid Line Volume (in^3) __________

C. Tank Stretch Factor (in^3/PSI) 0.034

D. Initial Weight of Bleed Unit Prior to Loading (lb) __________

E. Final Weight of Bleed Unit After Loading (lb) __________

*F. Resulting Load (lb) (Item D less Item E) __________

G. Specification Nominal Load at 70 ±5° F (lb) __________

H. Volume of GHE-GSE Line (in^3) __________

I. Volume of S/C GHE Line (in^3) __________

J. GSE Line Pressure (PSIG) __________

K. Bladder Pressure (PSIG) __________

L. Stabilized Equilibrium Pressure (PSIG) __________

M. Primary Liquid Close-Out Pressure (PSIG) __________

N. Specification Ullage @ A Above

Maximum __________

Minimum __________

O. Ullage Volume (in^3). Solve the following equation by substituting the values contained in the indicated steps. __________

$$\text{Ullage Volume} = H\left(\frac{J - L}{L - K}\right) - (C + S)(L + K + 14.7) + S(M) - I$$

Primary Fuel

P. Loading Temperature (°F) __________

Q. Tank Volume (in^3) @ 0.0 PSIG __________

R. Liquid Line Volume (in^3) __________

S. Tank Stretch Factor (in^3/PSI) 0.0652

Oxidizer

Secondary Oxidizer

A. Tank Volume (in^3) @ 0.0 PSIG __________

A1. Liquid Line Volume (in^3) __________

B. Tank Stretch Factor (in^3/PSI) 0.045

Primary Oxidizer

C. Tank Volume (in^3) @ 0.0 PSIG __________

C1. Liquid Line Volume (in^3) __________

D. Tank Stretch Factor (in^3/PSI) 0.088

PV Parameters for Combined Primary and Secondary Oxidizer Tanks

E. Volume of GHE-GSE Line (in^3) __________

F. Volume of S/C GHE Line (in^3) __________

G. GSE Line Pressure (PSIG) __________

H. Bladder Pressure (PSIG) __________

I. Stabilized Equilibrium Pressure (PSIG) __________

J. Loading Temperature (°F) __________

K. Oxidizer Density (lb/in^3); solve equation (4) below where T = Temperature @ J above __________

L. Specification Value @ Temperature J above (lb)

Maximum __________

Mimimum __________

M. PV Calculated Oxidizer Load (lb); solve equation (5) and (6) below by substituting the values contained in the above indicated steps where U = Volume of tank gas (in^3) in both tanks and He system, and F_o = PV calculated oxidizer load for both tanks

±2.3 __________

N. Specification Nominal Value @ Temperature J above (lb) __________

(4) Oxidizer Density = $0.451591(10^{-4})(11.8 - T) + 0.05475906$

(5) $U = E\left(\frac{G - I}{I - H}\right) - (B+D)(I+H+14.7)$

(6) $F_o = K(A + C + A1 + C1 - U + F)$

TABLE 4.3-3 (CONTINUED)

SERVICE MODULE RCS LOADING PARAMETERS AND CALCULATIONS - QUAD A

T. Fuel Density (lb/in^3); solve equation (1) below where T = Temperature @ P above ________

PV Parameters for Combined Primary and Secondary Fuel Tanks

U. Volume of GHE-GSE Line (in^3)________

V. Volume of S/C GHE Line (in^3)________

W. GSE Line Pressure (PSIG)__________

X. Bladder Pressure (PSIG) __________

Y. Stabilized Equilibrium Pressure (PSIG) __________

Z. Specification PV Value @ Temperature P above (lb)

Maximum __________

Minimum __________

Z1. PV calculated fuel load (lb)________ Solve equations (2) and (3) below by substituting the values contained in the above indicated steps where U_V = Volume or tanked gas (in^3) in the primary tank and F_L = PV calculated fuel load.

Z2. Specification Nominal __________ value @ temperature H above (lb)

Z3. Total fuel load (lb) __________ ±0.7 (Item F plus Item Z1)

(1) Fuel density = $0.0329456 - (0.186979)(10^{-4})(T)$

(2) $U_V = U\left(\frac{W - Y}{Y - X}\right) - (C + S)\ (Y + X + 14.7)$

*(3) $F_L = T\ (Q + R - U_V + V + B + B1 - \frac{F}{T})$

*Z4. Secondary Fuel Load by P.V. (lb)__________

* If secondary fuel load is determined by P.V. calculation, then in Equation Three (3), substitute item Z4 for item F.

TABLE 4.3-4

SERVICE MODULE RCS LOADING PARAMETERS AND CALCULATIONS - QUAD B

Fuel

Secondary Fuel

A. Loading Temperature (°F) ________

B. Tank Volume (in^3) @ 0.0 PSIG ________

B1. Liquid Line Volume (in^3) ________

C. Tank Stretch Factor (in^3/PSI) 0.034

D. Initial Weight of Bleed Unit Prior to Loading (lb) ________

E. Final Weight of Bleed Unit After Loading (lb) ________

*F. Resulting Load (lb) (Item D less Item E) ________

G. Specification Nominal Load at 70 ±5° F (lb) ________

H. Volume of GHE-GSE Line (in^3) ________

I. Volume of S/C GHE Line (in^3) ________

J. GSE Line Pressure (PSIG) ________

K. Bladder Pressure (PSIG) ________

L. Stabilized Equilibrium Pressure (PSIG) ________

M. Primary Liquid Close-Out Pressure (PSIG) ________

N. Specification Ullage @ A Above

Maximum ________

Minimum ________

O. Ullage Volume (in^3). Solve the following equation by substituting the values contained in the indicated steps. ________

$$\text{Ullage Volume} = H\left(\frac{J-L}{L-K}\right) - (C+S)(L+K+14.7) + S(M) - I$$

Primary Fuel

P. Loading Temperature (°F) ________

Q. Tank Volume (in^3) @ 0.0 PSIG ________

R. Liquid Line Volume (in^3) ________

S. Tank Stretch Factor (in^3/PSI) 0.0652

Oxidizer

Secondary Oxidizer

A. Tank Volume (in^3) @ 0.0 PSIG ________

A1. Liquid Line Volume (in^3) ________

B. Tank Stretch Factor (in^3/PSI) 0.045

Primary Oxidizer

C. Tank Volume (in^3) @ 0.0 PSIG ________

C1. Liquid Line Volume (in^3) ________

D. Tank Stretch Factor (in^3/PSI) 0.088

PV Parameters for Combined Primary and Secondary Oxidizer Tanks

E. Volume of GHE-GSE Line (in^3) ________

F. Volume of S/C GHE Line (in^3) ________

G. GSE Line Pressure (PSIG) ________

H. Bladder Pressure (PSIG) ________

I. Stabilized Equilibrium Pressure (PSIG) ________

J. Loading Temperature (°F) ________

K. Oxidizer Density (lb/in^3); solve equation (4) below where T = Temperature @ J above ________

L. Specification Value @ Temperature J above (lb)

Maximum ________

Minimum ________

M. PV Calculated Oxidizer Load (lb); solve equation (5) and (6) below by substituting the values contained in the above indicated steps where U = Volume of tank gas (in^3) in both tanks and He system, and F_o = PV calculated oxidizer load for both tanks ________ ±2.3

N. Specification Nominal Value @ Temperature J above (lb) ________

(4) Oxidizer Density = $0.451591(10^{-4})(11.8 - T) + 0.05475906$

(5) $U = E\left(\frac{G-I}{I-H}\right) - (B+D)(I+H+14.7)$

(6) $F_o = K(A + C + A1 + C1 - U + F)$

TABLE 4.3-4 (CONTINUED)

SERVICE MODULE RCS LOADING PARAMETERS AND CALCULATIONS - QUAD B

T. Fuel Density (lb/in^3); solve equation (1) below where T = Temperature @ P above ________

PV Parameters for Combined Primary and Secondary Fuel Tanks

U. Volume of GHE-GSE Line (in^3)________

V. Volume of S/C GHE Line (in^3)________

W. GSE Line Pressure (PSIG)________

X. Bladder Pressure (PSIG) ________

Y. Stabilized Equilibrium Pressure (PSIG) ________

Z. Specification PV Value @ Temperature P above (lb)

Maximum ________

Minimum ________

Z1. PV calculated fuel load (lb)________ Solve equations (2) and (3) below by substituting the values contained in the above indicated steps where U_V = Volume or tanked gas (in^3) in the primary tank and F_L = PV calculated fuel load.

Z2. Specification Nominal ________ value @ temperature H above (lb)

Z3. Total fuel load (lb) ________ ±0.7 (Item F plus Item Z1)

(1) Fuel density = 0.0329456 - (0.186979)(10^{-4})(T)

$$(2)\quad U_V = U\left(\frac{W - Y}{Y - X}\right) - (C + S)\ (Y + X + 14.7)$$

$$*(3)\quad F_L = T\ (Q + R - U_V + V + B + B1 - \frac{F}{T})$$

*Z4. Secondary Fuel Load by P.V. (lb)________

*If secondary fuel load is determined by P.V. calculation, then in Equation Three (3), substitute item Z4 for item F.

TABLE 4.3-5

SERVICE MODULE RCS LOADING PARAMETERS AND CALCULATIONS - QUAD C

Fuel

Secondary Fuel

A. Loading Temperature (°F) ________

B. Tank Volume (in^3) @ 0.0 PSIG ________

B1. Liquid Line Volume (in^3) ________

C. Tank Stretch Factor (in^3/PSI) 0.034

D. Initial Weight of Bleed Unit Prior to Loading (lb) ________

E. Final Weight of Bleed Unit After Loading (lb) ________

*F. Resulting Load (lb) (Item D less Item E) ________

G. Specification Nominal Load at 70 ±5° F (lb) ________

H. Volume of GHE-GSE Line (in^3) ________

I. Volume of S/C GHE Line (in^3) ________

J. GSE Line Pressure (PSIG) ________

K. Bladder Pressure (PSIG) ________

L. Stabilized Equilibrium Pressure (PSIG) ________

M. Primary Liquid Close-Out Pressure (PSIG) ________

N. Specification Ullage @ A Above

Maximum ________

Minimum ________

O. Ullage Volume (in^3). Solve the following equation by substituting the values contained in the indicated steps. ________

$$\text{Ullage Volume} = H\left(\frac{J - L}{L - K}\right) - (C + S)(L + K + 14.7) + S(M) - I$$

Primary Fuel

P. Loading Temperature (°F) ________

Q. Tank Volume (in^3) @ 0.0 PSIG ________

R. Liquid Line Volume (in^3) ________

S. Tank Stretch Factor (in^3/PSI) 0.0652

Oxidizer

Secondary Oxidizer

A. Tank Volume (in^3) @ 0.0 PSIG ________

A1. Liquid Line Volume (in^3) ________

B. Tank Stretch Factor (in^3/PSI) 0.045

Primary Oxidizer

C. Tank Volume (in^3) @ 0.0 PSIG ________

C1. Liquid Line Volume (in^3) ________

D. Tank Stretch Factor (in^3/PSI) 0.088

PV Parameters for Combined Primary and Secondary Oxidizer Tanks

E. Volume of GHE-GSE Line (in^3) ________

F. Volume of S/C GHE Line (in^3) ________

G. GSE Line Pressure (PSIG) ________

H. Bladder Pressure (PSIG) ________

I. Stabilized Equilibrium Pressure (PSIG) ________

J. Loading Temperature (°F) ________

K. Oxidizer Density (lb/in^3); solve equation (4) below where T = Temperature @ J above ________

L. Specification Value @ Temperature J above (lb)

Maximum ________

Minimum ________

M. PV Calculated Oxidizer Load (lb); solve equation (5) and (6) below by substituting the values contained in the above indicated steps where U = Volume of tank gas (in^3) in both tanks and He system, and F_o = PV calculated oxidizer load for both tanks

________ ±2.3

N. Specification Nominal Value @ Temperature J above (lb) ________

(4) $\text{Oxidizer Density} = 0.451591(10^{-4})(11.8 - T) + 0.05475906$

(5) $U = E\left(\frac{G - I}{I - H}\right) - (B+D)(I+H+14.7)$

(6) $F_o = K(A + C + A1 + C1 - U + F)$

TALBE 4.3-5 (CONTINUED)

SERVICE MODULE RCS LOADING PARAMETERS AND CALCULATIONS - QUAD C

T. Fuel Density (lb/in^3); solve equation (1) below where T = Temperature @ P above ________

PV Parameters for Combined Primary and Secondary Fuel Tanks

U. Volume of GHE-GSE Line (in^3)________

V. Volume of S/C GHE Line (in^3)________

W. GSE Line Pressure (PSIG)________

X. Bladder Pressure (PSIG) ________

Y. Stabilized Equilibrium Pressure (PSIG) ________

Z. Specification PV Value @ Temperature P above (lb)

Maximum ________

Minimum ________

Z1. PV calculated fuel load (lb)________ Solve equations (2) and (3) below by substituting the values contained in the above indicated steps where U_V = Volume or tanked gas (in^3) in the primary tank and F_L = PV calculated fuel load.

Z2. Specification Nominal ________ value @ temperature H above (lb)

Z3. Total fuel load (lb) ________ ±0.7 (Item F plus Item Z1)

(1) Fuel density = 0.0329456 - (0.186979)(10^{-4})(T)

(2) $U_V = U\left(\frac{W - Y}{Y - X}\right) - (C + S)\ (Y + X + 14.7)$

*(3) $F_L = T\ (Q + R - U_V + V + B + B1 - \frac{F}{T})$

*Z4. Secondary Fuel Load by P.V. (lb)________

*If secondary fuel load is determined by P.V. calculation, then in Equation Three (3), substitute item Z4 for item F.

TABLE 4.3-6

SERVICE MODULE RCS LOADING PARAMETERS AND CALCULATIONS - QUAD D

Fuel

Secondary Fuel

A. Loading Temperature (°F)

B. Tank Volume (in^3) @ 0.0 PSIG

B1. Liquid Line Volume (in^3)

C. Tank Stretch Factor (in^3/PSI) 0.034

D. Initial Weight of Bleed Unit Prior to Loading (lb)

E. Final Weight of Bleed Unit After Loading (lb)

*F. Resulting Load (lb) (Item D less Item E)

G. Specification Nominal Load at 70 ±5° F (lb)

H. Volume of GHE-GSE Line (in^3)

I. Volume of S/C GHE Line (in^3)

J. GSE Line Pressure (PSIG)

K. Bladder Pressure (PSIG)

L. Stabilized Equilibrium Pressure (PSIG)

M. Primary Liquid Close-Out Pressure (PSIG)

N. Specification Ullage @ A Above

Maximum

Minimum

O. Ullage Volume (in^3). Solve the following equation by substituting the values contained in the indicated steps.

$$\text{Ullage Volume} = H\left(\frac{J-L}{L-K}\right) - (C+S)(L+K+14.7) + S(M) - I$$

Primary Fuel

P. Loading Temperature (°F)

Q. Tank Volume (in^3) @ 0.0 PSIG

R. Liquid Line Volume (in^3)

S. Tank Stretch Factor (in^3/PSI) 0.0652

Oxidizer

Secondary Oxidizer

A. Tank Volume (in^3) @ 0.0 PSIG

A1. Liquid Line Volume (in^3)

B. Tank Stretch Factor (in^3/PSI) 0.045

Primary Oxidizer

C. Tank Volume (in^3) @ 0.0 PSIG

C1. Liquid Line Volume (in^3)

D. Tank Stretch Factor (in^3/PSI) 0.088

PV Parameters for Combined Primary and Secondary Oxidizer Tanks

E. Volume of GHE-GSE Line (in^3)

F. Volume of S/C GHE Line (in^3)

G. GSE Line Pressure (PSIG)

H. Bladder Pressure (PSIG)

I. Stabilized Equilibrium Pressure (PSIG)

J. Loading Temperature (°F)

K. Oxidizer Density (lb/in^3); solve equation (4) below where T = Temperature @ J above

L. Specification Value @ Temperature J above (lb)

Maximum

Minimum

M. PV Calculated Oxidizer Load (lb); solve equation (5) and (6) below by substituting the values contained in the above indicated steps where U = Volume of tank gas (in^3) in both tanks and He system, and F_o = PV calculated oxidizer load for both tanks ±2.3

N. Specification Nominal Value @ Temperature J above (lb)

(4) Oxidizer Density = $0.451591(10^{-4})(11.8 - T) + 0.05475906$

(5) $U = E\left(\frac{G-I}{I-H}\right) - (B+D)(I+H+14.7)$

(6) $F_o = K(A + C + A1 + C1 - U + F)$

TABLE 4.3-6 (CONTINUED)

SERVICE MODULE RCS LOADING PARAMETERS AND CALCULATIONS - QUAD D

T. Fuel Density (lb/in^3); solve equation (1) below where T = Temperature @ P above __________

PV Parameters for Combined Primary and Secondary Fuel Tanks

U. Volume of GHE-GSE Line (in^3) __________

V. Volume of S/C GHE Line (in^3) __________

W. GSE Line Pressure (PSIG) __________

X. Bladder Pressure (PSIG) __________

Y. Stabilized Equilibrium Pressure (PSIG) __________

Z. Specification PV Value @ Temperature P above (lb)

Maximum __________

Minimum __________

Z1. PV calculated fuel load (lb) __________ Solve equations (2) and (3) below by substituting the values contained in the above indicated steps where U_V = Volume or tanked gas (in^3) in the primary tank and F_L = PV calculated fuel load.

Z2. Specification Nominal value @ temperature H above (lb) __________

Z3. Total fuel load (lb) __________ ±0.7 (Item F plus Item Z1)

(1) Fuel density = $0.0329456 - (0.186979)(10^{-4})(T)$

(2) $U_V = U\left(\frac{W - Y}{Y - X}\right) - (C + S)\ (Y + X + 14.7)$

*(3) $F_L = T\ (Q + R - U_V + V + B + B1 - \frac{F}{T})$

*Z4. Secondary Fuel Load by P.V. (lb) __________

*If secondary fuel load is determined by P.V. calculation, then in Equation Three (3), substitute item Z4 for item F.

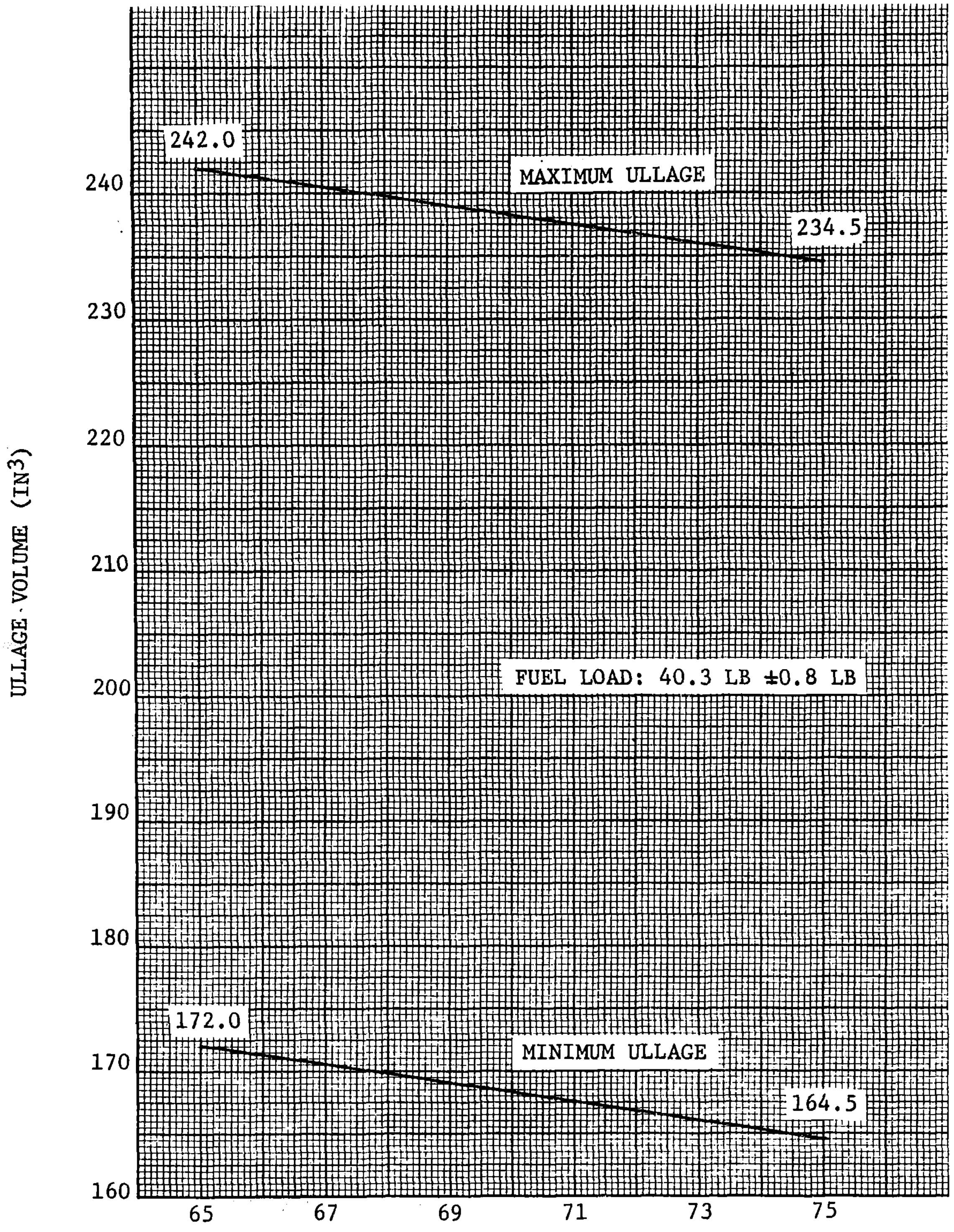

FIGURE 4.3-1. CSM 104 AND SUBSEQUENT SECONDARY FUEL TANK ULLAGE VOLUME RANGE

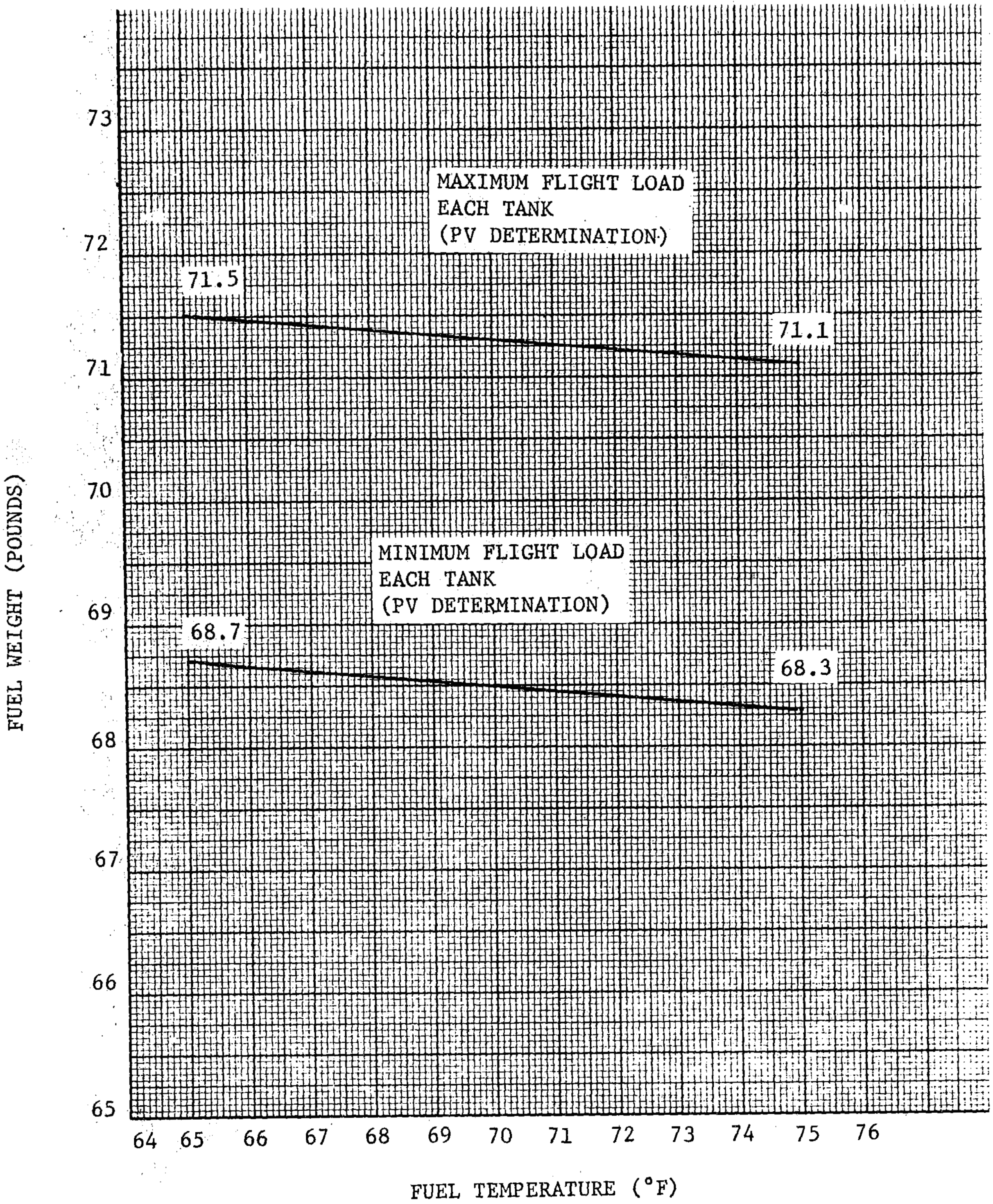

FIGURE 4.3-2. SM RCS PRIMARY FUEL TANK LOAD WINDOW

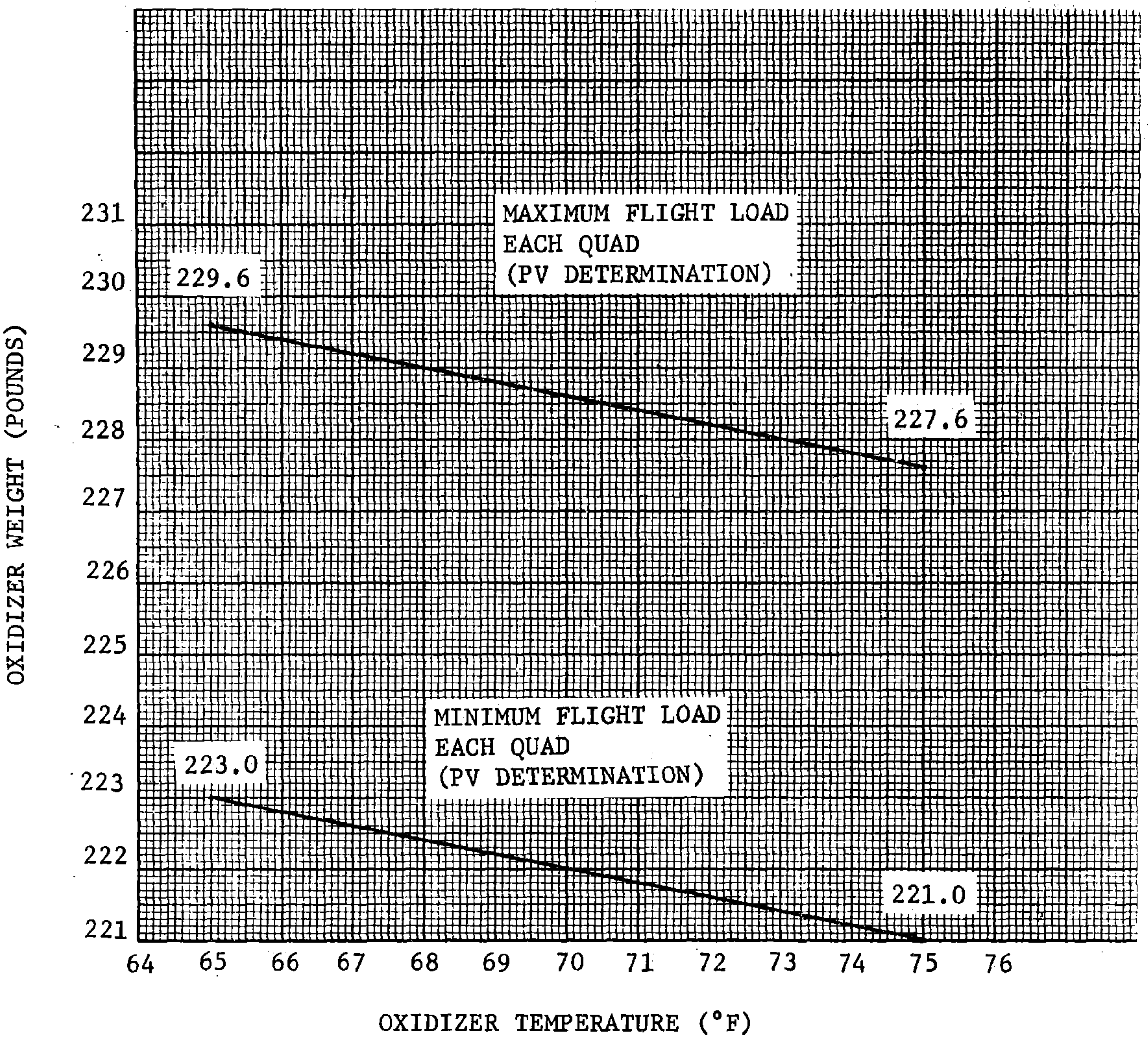

FIGURE 4.3-3. SM RCS COMBINED PRIMARY-SECONDARY OXIDIZER TANK LOAD WINDOW

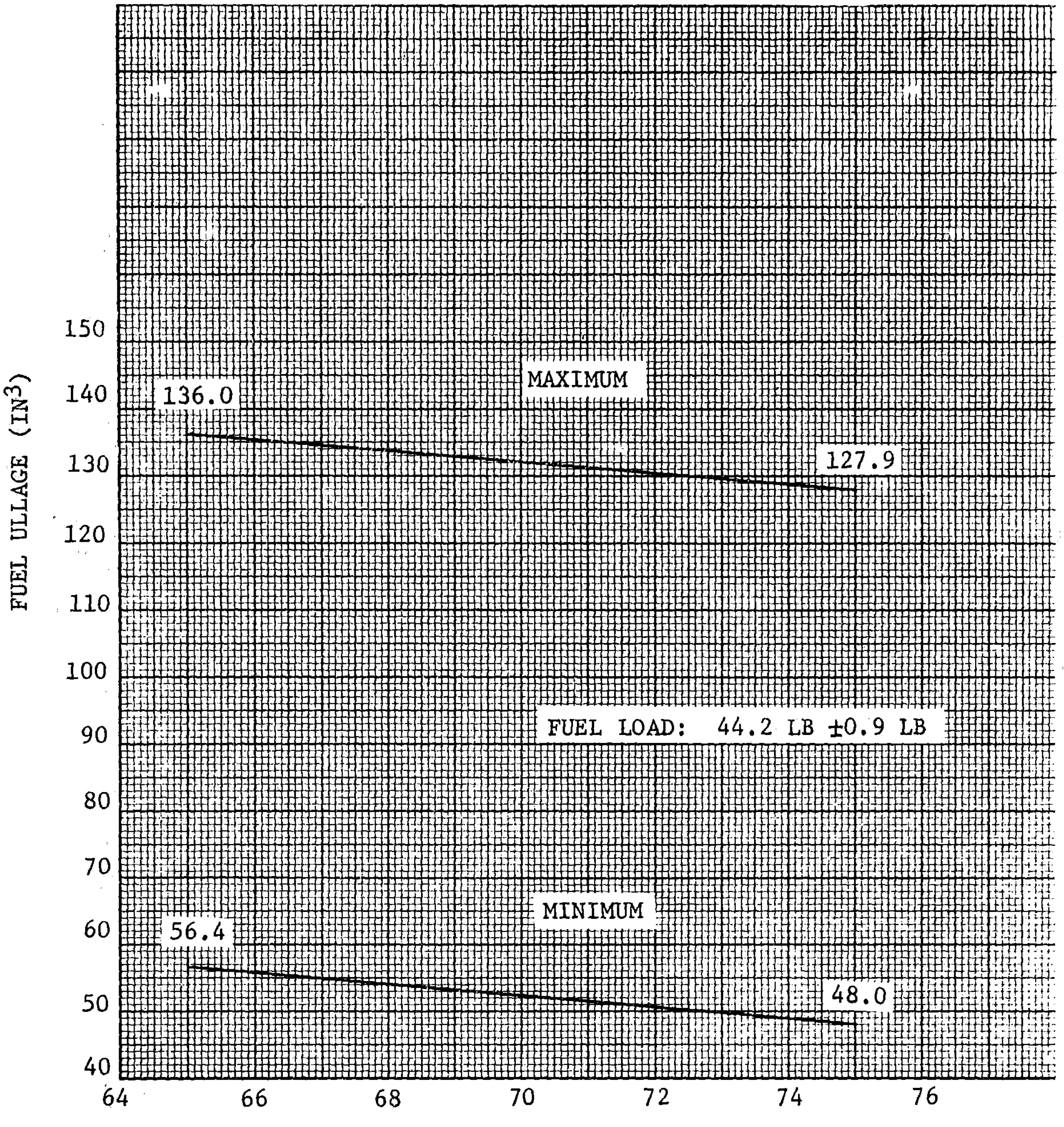

FIGURE 4.3-4. CSM 104 AND SUBSEQUENT CM RCS FUEL TANK ULLAGES VS. TEMPERATURE

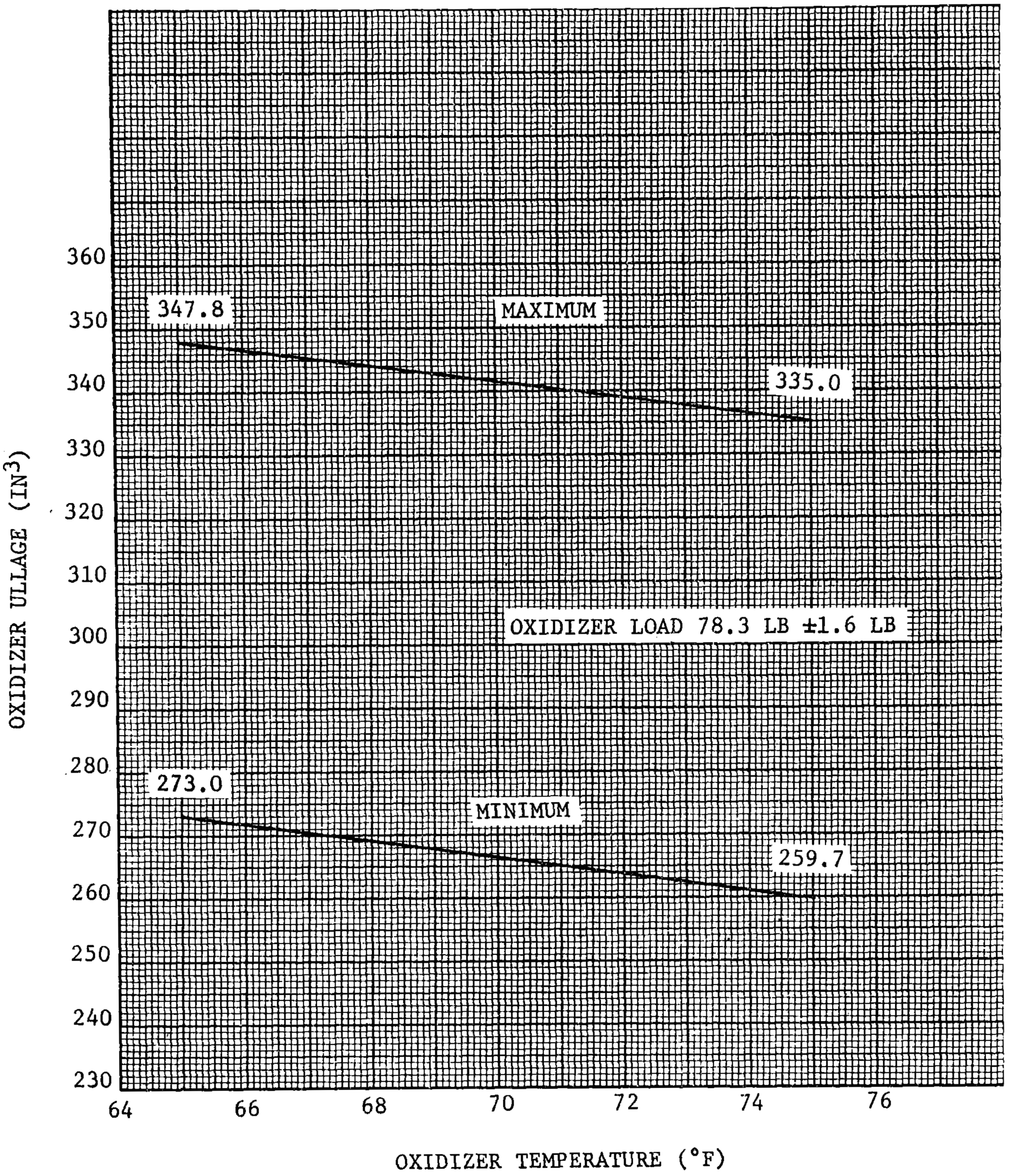

FIGURE 4.3-5. CSM 104 AND SUBSEQUENT CM RCS OXIDIZER TANK ULLAGE VS. TEMPERATURE

TO BE SUPPLIED.

CM ABLATOR DATA

5.0 LM REFERENCE CONSUMABLES MASS PROPERTIES DATA

The data presented in this section will enable the user to obtain the separate centers-of-gravity and moments-of-inertia for those LM spacecraft consumables that significantly affect overall LM performance. LM consumables mass property data must be compared to the current on-board consumable loading data for each mission provided in Section 3.0. The mass property data are presented in the following sections:

5.1 LM Descent Tank Mass Properties
    Table 5.1-1 LM 10 and Subsequent DPS Fuel Mass Properties
    Table 5.1-2 LM 10 and Subsequent DPS Oxidizer Mass Properties
5.2 LM Ascent Tank Mass Properties
5.3 LM RCS Tank Mass Properties
5.4 LM Descent Water Tank Mass Properties
    Table 5.4-1 LM 10 and Subsequent Descent Water Tank Mass Properties
5.5 LM Ascent Water Tank Mass Properties
5.6 LM Trapped and Residual Propellants, and Miscellaneous Consumables

LUNAR MODULE DESCENT PROPELLANT

MASS PROPERTIES

NOTE:

1. Mass Properties are given for liquid in individual tanks.
2. Moments of Inertia are about center of gravity of propellant in individual tanks, coordinates of which are given.
3. Centers of Gravity in Y and Z directions are given at top of each page.
4. The number of tanks of a particular kind is indicated by the last number on the first line of each page.

TABLE 5.1-1
LM 10 AND SUBSEQUENT DPS FUEL MASS PROPERTIES

Pressure = 235.0 psia - 2 Tanks
Cylinder Height = 22.64 in.
Density = 56.46 lbs/cu. ft.
Y-CG = + OR - 54.0 in. (Const)
Pressurized Height = 22.75 in.

Temperature = 70.0 F
Tank Radius = 25.50 in.
Bottom of Tank = 123.84 in.
Z-CG = 0.0 in. (Const)
Pressurized Radius = 25.61 in.
Ixx = 0.0

Weight (lbs)	XCG (in.)	Inertia (Slug-Ft Sq) Iyy - Izz	Percent Full	Height (in.)	Rigid (lbs)	Slosh (lbs)	H/2R
3822.6	160.8	0.00	100.0	73.96	3822.6	0.0	1.44
3784.3	160.5	6.16	99.0	70.06	3587.6	196.7	1.37
3746.1	160.3	8.81	98.0	68.38	3477.7	268.5	1.33
3707.9	160.2	11.14	97.0	67.05	3380.0	327.8	1.31
3669.7	160.1	13.17	96.0	65.92	3292.6	377.0	1.29
3631.4	160.1	14.97	95.0	64.90	3213.3	418.2	1.27
3593.2	160.0	16.68	94.0	63.95	3140.4	452.8	1.25
3555.0	160.0	17.83	93.0	63.09	3072.3	482.6	1.23
3516.8	159.9	18.67	92.0	62.26	3008.1	508.7	1.22
3478.5	159.8	19.22	91.0	61.48	2946.8	531.7	1.20
3440.3	159.7	19.49	90.0	60.72	2888.1	552.2	1.19
3402.1	159.6	19.51	89.0	60.00	2831.5	570.6	1.17
3363.8	159.4	19.29	88.0	59.29	2776.6	587.2	1.16
3325.6	159.3	18.85	87.0	58.61	2723.3	602.3	1.14
3287.4	159.2	18.21	86.0	57.94	2671.4	616.0	1.13
3249.2	159.0	17.37	85.0	57.29	2620.5	628.7	1.12
3210.9	158.8	16.37	84.0	56.65	2570.7	640.3	1.11
3172.7	158.6	15.24	83.0	56.02	2521.8	651.0	1.09
3134.5	158.5	14.37	82.0	55.40	2473.6	660.9	1.08
3096.3	158.3	13.51	81.0	54.79	2426.1	670.2	1.07
3058.0	158.1	12.68	80.0	54.19	2379.2	678.8	1.06
3019.8	157.9	11.86	79.0	53.59	2332.9	687.0	1.05
2981.6	157.7	11.08	78.0	53.00	2286.9	694.6	1.04
2943.4	157.6	10.32	77.0	52.42	2241.4	701.9	1.02
2905.1	157.4	9.80	76.0	51.84	2196.2	708.9	1.01
2866.9	157.2	8.90	75.0	51.26	2151.3	715.6	1.00
2828.7	157.0	8.24	74.0	50.69	2106.7	722.0	0.99
2790.5	156.8	7.60	73.0	50.11	2063.8	726.7	0.98
2752.2	156.6	6.99	72.0	49.55	2021.2	731.0	0.97
2714.0	156.4	6.41	71.0	48.98	1979.0	735.0	0.96
2675.8	156.3	5.86	70.0	48.41	1937.0	738.8	0.95

TABLE 5.1-1 (CONTINUED)

LM 10 AND SUBSEQUENT DPS FUEL MASS PROPERTIES

Pressure = 235.0 psia - 2 Tanks
Cylinder Height = 22.64 in.
Density = 56.46 lbs/cu. ft.
Y-CG = + OR - 54.0 in. (Const)
Pressurized Height = 22.75 in.

Temperature = 70.0 F
Tank Radius = 25.50 in.
Bottom of Tank = 123.84 in.
Z-CG = 0.0 IN. (CONST)
Pressurized Radius = 25.61 in.
Ixx = 0.0

Weight (lbs)	XCG (in.)	Inertia (Slug-Ft Sq) Iyy - Izz	Percent Full	Height (in.)	Rigid (lbs)	Slosh (lbs)	H/2R
2637.6	156.1	5.33	69.0	47.84	1895.2	742.4	0.93
2599.3	155.9	4.83	58.0	47.27	1853.5	745.8	0.92
2561.1	155.7	4.37	67.0	46.70	1812.2	748.9	0.91
2522.9	155.5	3.95	66.0	46.12	1771.1	751.8	0.90
2484.7	155.3	3.55	65.0	45.55	1730.3	754.4	0.89
2446.4	155.1	3.18	64.0	44.98	1689.7	756.7	0.88
2408.2	154.9	2.85	63.0	44.41	1649.5	758.7	0.87
2370.0	154.7	2.54	62.0	43.84	1609.5	760.5	0.86
2331.8	154.5	2.26	61.0	43.27	1569.8	762.0	0.84
2293.5	154.3	2.00	60.0	42.70	1530.4	763.1	0.83
2255.3	154.1	1.77	59.0	42.13	1491.3	764.0	0.82
2217.1	153.9	1.56	58.0	41.56	1452.5	764.8	0.81
2178.9	153.7	1.37	57.0	40.99	1414.0	764.9	0.80
2140.6	153.6	1.20	56.0	40.42	1375.8	764.8	0.79
2102.4	153.4	1.05	55.0	39.84	1337.9	764.5	0.78
2064.2	153.2	0.91	54.0	39.27	1300.3	763.9	0.77
2026.0	153.0	0.79	53.0	38.70	1263.0	762.9	0.76
1987.7	152.9	0.69	52.0	38.13	1226.1	761.7	0.74
1949.5	152.7	0.60	51.0	37.56	1189.4	760.1	0.73
1911.3	152.5	0.52	50.0	36.99	1153.1	758.2	0.72
1873.1	152.4	0.45	49.0	36.42	1117.1	756.0	0.71
1834.8	152.2	0.39	48.0	35.85	1081.4	753.4	0.70
1796.6	152.1	0.33	47.0	35.28	1046.0	750.6	0.69
1758.4	151.9	0.29	46.0	34.71	1011.0	747.3	0.68
1720.2	151.8	0.25	45.0	34.13	976.3	743.8	0.67
1681.9	151.6	0.21	44.0	33.56	942.0	739.9	0.66
1643.7	151.5	0.18	43.0	32.99	908.0	735.7	0.64
1605.5	151.4	0.16	42.0	32.42	874.3	731.1	0.63
1567.2	151.3	0.13	41.0	31.85	841.0	726.2	0.62
1529.0	151.1	0.11	40.0	31.28	808.1	720.9	0.61
1490.8	151.0	0.10	39.0	30.71	775.5	715.3	0.60
1452.6	150.9	0.08	38.0	30.14	743.2	709.3	0.59

TABLE 5.1-1 (CONTINUED)

LM 10 AND SUBSEQUENT DPS FUEL MASS PROPERTIES

Pressure = 235.0 psia - 2 Tanks
Cylinder Height = 22.64 in.
Density = 56.46 lbs/cu. ft.
Y-CG = + OR - 54.0 in. (Const)
Pressurized Height = 22.75 in.

Temperature = 70.0 F
Tank Radius = 25.50 in.
Bottom of Tank - 123.84 in.
Z-CG = 0.0in. (Const)
Pressurized Radius = 25.61 in.
Ixx = 0.0

Weight (lbs)	XCG (in.)	Inertia (Slug-Ft Sq) Iyy - Izz	Percent Full	Height (in.)	Rigid (lbs)	Slosh (lbs)	H/2R
1414.3	150.8	0.07	37.0	29.57	711.3	703.0	0.58
1376.1	150.7	0.06	36.0	29.00	679.8	696.3	0.57
1337.9	150.6	0.05	35.0	28.42	648.7	689.2	0.55
1299.7	150.5	0.04	34.0	27.85	617.9	681.8	0.54
1261.4	150.4	0.04	33.0	27.28	587.4	674.0	0.53
1223.2	150.4	0.03	32.0	26.71	557.4	665.8	0.52
1185.0	150.3	0.03	31.0	26.14	527.7	657.3	0.51
1146.8	150.2	0.02	30.0	25.57	498.8	648.0	0.50
1108.5	150.1	0.02	29.0	25.00	471.2	637.3	0.49
1070.3	150.0	0.02	28.0	24.43	444.3	626.0	0.48
1032.1	150.0	0.01	27.0	23.86	417.9	614.2	0.47
993.9	149.9	0.01	26.0	23.29	392.1	601.7	0.45
955.6	149.8	0.01	25.0	22.72	366.9	588.7	0.44
917.4	149.8	0.01	24.0	22.14	342.3	575.2	0.43
879.2	149.7	0.01	23.0	21.56	318.2	561.0	0.42
841.0	149.7	0.00	22.0	20.98	294.6	546.4	0.41
802.7	149.6	0.00	21.0	20.39	271.6	531.1	0.40
764.5	149.6	0.00	20.0	19.79	249.2	515.3	0.39
726.3	149.5	0.00	19.0	19.19	227.3	499.0	0.37
688.1	149.5	0.00	18.0	18.58	206.1	482.0	0.36
649.8	149.5	0.00	17.0	17.98	185.4	464.5	0.35
611.6	149.5	0.00	16.0	17.33	165.3	446.3	0.34
573.4	149.5	0.00	15.0	16.69	145.9	427.5	0.33
535.2	149.5	0.00	14.0	16.04	127.1	408.1	0.31
496.9	149.5	0.00	13.0	15.37	109.0	387.9	0.30
458.7	149.5	0.00	12.0	14.69	91.7	367.0	0.29
420.5	149.5	0.00	11.0	13.98	75.2	345.3	0.27
382.3	149.5	0.00	10.0	13.26	59.5	322.8	0.26
344.0	149.5	0.00	9.0	12.50	44.8	299.2	0.24
305.8	149.5	0.00	8.0	11.72	31.1	274.7	0.23
267.6	149.5	0.00	7.0	10.89	18.7	248.9	0.21
229.4	149.5	0.00	6.0	10.02	7.7	221.6	0.20

TABLE 5.1-1 (CONCLUDED)

LM 10 AND SUBSEQUENT DPS FUEL MASS PROPERTIES

Pressure = 235.0 psia - 2 Tanks
Cylinder Height = 22.64 in.
Density = 56.46 lbs/cu. ft.
Y-CG = + OR - 54.0 in. (Const)
Pressurized Height = 22.75 in.

Temperature = 70.0 F
Tank Radius = 25.50 in.
Bottom of Tank - 123.84 in.
Z-CG = 0.0 in. (Const)
Pressurized Radius = 25.61 in.
Ixx = 0.0

Weight (lbs)	XCG (in.)	Inertia (Slug-Ft Sq) Iyy - Izz	Percent Full	Height (in.)	Rigid (lbs)	Slosh (lbs)	H/2R
191.1	149.5	0.00	5.0	9.08	0.0	191.1	0.18
152.9	149.5	0.00	4.0	8.06	0.0	152.9	0.16
114.7	149.5	0.00	3.0	6.92	0.0	114.7	0.14
76.5	149.5	0.00	2.0	5.60	0.0	76.5	0.11
38.2	149.5	0.00	1.0	3.91	0.0	38.2	0.08
0.0	149.5	0.00	0.0	0.00	0.0	0.0	0.00

TABLE 5.1-2

LM 10 AND SUBSEQUENT DPS OXIDIZER MASS PROPERTIES

Pressure = 235.0 psia - 2 Tanks
Cylinder Height = 22.64 in.
Density = 90.26 lbs/cu. ft.
Y-CG = 0.0 in. (Const)
Pressurized Height = 22.75 in.

Temperature = 70.0 F
Tank Radius = 25.50 in.
Bottom of Tank = 123.84 in.
Z-CG = + OR - 54.0 in. (Const)
Pressurized Radius = 25.61 in.
Ixx = 0.0

Weight (lbs)	XCG (in.)	Inertia (Slug-Ft Sq) Iyy - Izz	Percent Full	Height (in.)	Rigid (lbs)	Slosh (lbs)	H/2R
6110.9	160.8	0.00	100.0	73.96	6110.9	0.0	1.44
6049.8	160.5	9.84	99.0	70.06	5735.3	314.5	1.37
5988.7	160.3	14.09	98.0	68.38	5559.5	429.2	1.33
5927.6	160.2	17.80	97.0	67.05	5403.5	524.1	1.31
5866.5	160.1	21.06	96.0	65.92	5263.7	602.8	1.29
5805.4	160.1	23.93	95.0	64.90	5136.9	668.5	1.27
5744.3	160.0	26.67	94.0	63.98	5020.4	723.9	1.25
5683.2	160.0	28.51	93.0	63.09	4911.6	771.6	1.23
5622.0	159.9	29.85	92.0	62.26	4808.8	813.2	1.22
5560.9	159.8	30.72	91.0	61.48	4711.0	850.0	1.20
5499.8	159.7	31.16	90.0	60.72	4617.1	882.8	1.19
5438.7	159.6	31.19	89.0	60.00	4526.6	912.2	1.17
5377.6	159.4	30.84	88.0	59.29	4438.9	938.7	1.16
5316.6	159.3	30.14	87.0	58.61	4353.7	962.8	1.14
5255.4	159.2	29.10	86.0	57.94	4270.6	984.8	1.13
5194.3	159.0	27.77	85.0	57.29	4189.3	1005.0	1.12
5133.2	158.8	26.18	84.0	56.65	4109.6	1023.5	1.11
5072.1	158.6	24.37	83.0	56.02	4031.4	1040.7	1.09
5011.0	158.5	22.97	82.0	55.40	3954.4	1056.6	1.08
4949.8	158.3	21.60	81.0	54.79	3878.5	1071.4	1.07
4888.7	158.1	20.26	80.0	54.19	3803.5	1085.2	1.06
4827.6	157.9	18.97	79.0	53.59	3729.4	1098.2	1.05
4766.5	157.7	17.71	78.0	53.00	3656.0	1110.5	1.03
4705.4	157.6	16.51	77.0	52.42	3583.3	1122.2	1.02
4644.3	157.4	15.35	76.0	51.84	3511.0	1133.3	1.01
4583.2	157.2	14.23	75.0	51.26	3439.2	1143.9	1.00
4522.1	157.0	13.17	74.0	50.69	3367.9	1154.2	0.99
4461.0	156.8	12.14	73.0	50.11	3299.2	1161.7	0.98
4399.9	156.6	11.17	72.0	49.55	3231.2	1168.7	0.97
4338.8	156.4	10.24	71.0	48.98	3163.7	1175.1	0.96
4277.6	156.3	9.37	70.0	48.41	3096.6	1181.0	0.95

TABLE 5.1-2 (CONTINUED)

LM 10 AND SUBSEQUENT DPS OXIDIZER MASS PROPERTIES

Pressure = 235.0 psia - 2 Tanks
Cylinder Height = 22.64 in.
Density = 90.26 lbs/cu. ft.
Y-CG = 0.0 in.(Const)
Pressurized Height = 22.75 in.

Temperature = 70.0 F
Tank Radius = 25.50 in.
Bottom of Tank = 123.84 in.
Z-CG = + OR - 54.0 in.(Const)
Pressurized Radius = 25.61 in.
Ixx = 0.0

Weight (lbs)	XCG (in.)	Inertia (Slug-Ft Sq) Iyy - Izz	Percent Full	Height (in.)	Rigid (lbs)	Slosh (lbs)	H/2R
4216.5	156.1	8.52	69.0	47.84	3029.7	1186.8	0.93
4155.4	155.9	7.73	68.0	47.27	2963.1	1192.3	0.92
4094.3	155.7	6.99	67.0	46.70	2897.0	1197.3	0.91
4033.2	155.5	6.31	66.0	46.12	2831.3	1201.9	0.90
3972.1	155.3	5.67	65.0	45.55	2766.1	1206.0	0.89
3911.0	155.1	5.09	64.0	44.98	2701.3	1209.7	0.88
3849.9	154.9	4.55	63.0	44.41	2636.9	1213.0	0.87
3788.8	154.7	4.06	62.0	43.84	2573.0	1215.8	0.86
3727.7	154.5	3.61	61.0	43.27	2509.6	1218.1	0.84
3666.6	154.3	3.20	60.0	42.70	2446.6	1220.0	0.83
3605.4	154.1	2.83	59.0	42.13	2384.1	1221.4	0.82
3544.3	153.9	2.49	58.0	41.56	2322.0	1222.3	0.81
3483.2	153.7	2.19	57.0	40.99	2260.5	1222.7	0.80
3422.1	153.6	1.91	56.0	40.42	2199.4	1222.7	0.79
3361.0	153.4	1.67	55.0	39.84	2138.8	1222.2	0.78
3299.9	153.2	1.46	54.0	39.27	2078.7	1221.2	0.77
3238.8	153.0	1.27	53.0	38.70	2019.1	1219.7	0.76
3177.7	152.9	1.10	52.0	38.13	1960.0	1217.7	0.74
3116.6	152.7	0.96	51.0	37.56	1901.4	1215.1	0.73
3055.5	152.5	0.83	50.0	36.99	1843.4	1212.1	0.72
2994.4	152.4	0.72	49.0	36.42	1785.8	1208.5	0.71
2933.2	152.2	0.62	48.0	35.85	1728.8	1204.5	0.70
2872.1	152.1	0.54	47.0	35.28	1672.3	1199.9	0.69
2811.0	151.9	0.46	46.0	34.71	1616.3	1194.7	0.68
2749.9	151.8	0.40	45.0	34.13	1560.8	1189.1	0.67
2688.8	151.6	0.34	44.0	33.56	1505.9	1182.9	0.66
2627.7	151.5	0.29	43.0	32.99	1451.6	1176.1	0.64
2566.6	151.4	0.25	42.0	32.42	1397.8	1168.8	0.63
2505.5	151.3	0.21	41.0	31.65	1344.5	1161.0	0.62
2444.4	151.1	0.18	40.0	31.28	1291.8	1152.5	0.61
2383.3	151.0	0.16	39.0	30.71	1239.7	1143.5	0.60
2322.2	150.9	0.13	38.0	30.14	1188.2	1134.0	0.59

TABLE 5.1-2 (CONTINUED)

LM 10 AND SUBSEQUENT DPS OXIDIZER MASS PROPERTIES

Pressure = 235.0 psia - 2 Tanks
Cylinder Height = 22.64 in.
Density = 90.26 lbs/cu. ft.
Y-CG = 0.0 in. (Const)
Pressurized Height = 22.75 in.

Temperature = 70.0 F
Tank Radius = 25.50 in.
Bottom of Tank = 123.84 in.
Z-CG = + OR - 54.0 in. (Const)
Pressurized Radius = 25.61 in.
Ixx = 0.0

Weight (lbs)	XCG (in.)	Inertia (Slug-Ft Sq) Iyy - Izz	Percent Full	Height (in.)	Rigid (lbs)	Slosh (lbs)	H/2R
2261.0	150.8	0.11	37.0	29.57	1137.2	1123.9	0.58
2199.9	150.7	0.10	36.0	29.00	1086.8	1113.1	0.57
2138.8	150.6	0.08	35.0	28.42	1037.0	1101.9	0.55
2077.7	150.5	0.07	34.0	27.85	987.7	1090.0	0.54
2016.6	150.4	0.08	33.0	27.28	939.1	1077.5	0.53
1955.5	150.4	0.05	32.0	26.71	891.1	1064.4	0.52
1894.4	150.3	0.04	31.0	26.14	843.7	1050.7	0.51
1833.3	150.2	0.04	30.0	25.57	797.3	1035.9	0.50
1772.2	150.1	0.03	29.0	25.00	753.3	1018.8	0.49
1711.1	150.0	0.03	28.0	24.43	710.3	1000.8	0.48
1649.9	150.0	0.02	27.0	23.85	668.1	981.8	0.47
1588.8	149.9	0.02	26.0	23.29	626.9	961.9	0.45
1527.7	149.8	0.02	25.0	22.72	586.6	941.2	0.44
1466.6	149.8	0.01	24.0	22.14	547.1	919.5	0.43
1405.5	149.7	0.01	23.0	21.55	508.6	896.9	0.42
1344.4	149.7	0.01	22.0	20.98	471.0	873.4	0.41
1283.3	149.6	0.00	21.0	20.39	434.2	849.1	0.40
1222.2	149.6	0.00	20.0	19.79	398.4	823.8	0.39
1161.1	149.5	0.00	19.0	19.19	363.4	797.7	0.37
1100.0	149.5	0.00	18.0	18.58	329.4	770.6	0.36
1038.9	149.5	0.00	17.0	17.96	296.4	742.5	0.35
977.7	149.5	0.00	16.0	17.33	264.3	713.5	0.34
916.6	149.5	0.00	15.0	16.69	233.2	683.4	0.33
855.5	149.5	0.00	14.0	16.04	203.2	652.3	0.31
794.4	149.5	0.00	13.0	15.37	174.3	620.1	0.30
733.3	149.5	0.00	12.0	14.69	146.6	586.7	0.29
672.2	149.5	0.00	11.0	13.96	120.2	552.0	0.27
611.1	149.5	0.00	10.0	13.26	95.1	516.0	0.26
550.0	149.5	0.00	9.0	12.50	71.6	478.4	0.24

TABLE 5.1-2 (CONCLUDED)

LM 10 AND SUBSEQUENT DPS OXIDIZER MASS PROPERTIES

Pressure = 235.0 psia - 2 Tanks
Cylinder Height = 22.64 in.
Density = 90.26 lbs/cu. ft.
Y-CG = 0.0 in. (Const)
Pressurized Height = 22.75 in.

Temperature = 70.0 F
Tank Radius = 25.50 in.
Bottom of Tank = 123.84 in.
Z-CG = + OR - 54.0 in. (Const)
Pressurized Radius = 25.61 in.
Ixx = 0.0

Weight (lbs)	XCG (in.)	Inertia (Slug-Ft Sq) Iyy - Izz	Percent Full	Height (in.)	Rigid (lbs)	Slosh (lbs)	H/2R
488.9	149.5	0.00	8.0	11.72	49.8	439.1	0.23
427.8	149.5	0.00	7.0	10.89	29.9	397.9	0.21
366.7	149.5	0.00	6.0	10.02	12.3	354.3	0.20
305.5	149.5	0.00	5.0	9.08	0.0	305.5	0.18
244.4	149.5	0.00	4.0	8.06	0.0	244.4	0.16
183.3	149.5	0.00	3.0	6.92	0.0	183.3	0.14
122.2	145.5	0.00	2.0	5.60	0.0	122.2	0.11
61.1	149.5	0.00	1.0	3.91	0.0	61.1	0.08
0.0	149.5	0.00	0.0	0.00	0.0	0.0	0.00

TABLE 5.2-1

APS TANKED FUEL MASS PROPERTIES

The following mass properties are to be used over the entire range of tanked fuel quantity:

X_{cg} = 228.0 inches
Y_{cg} = -71.3 inches
Z_{cg} = 0.0 inches
I_{xx} = 0 slug-feet^2
I_{yy} = 0 slug-feet^2
I_{zz} = 0 slug-feet^2
I_{xy} = 0 slug-feet^2
I_{xz} = 0 slug-feet^2
I_{yz} = 0 slug-feet^2

TABLE 5.2-2

APS TANKED OXIDIZER MASS PROPERTIES

The following mass properties are to be used over the entire range of tanked oxidizer quantity:

X_{cg} = 228.0 inches

Y_{cg} = 44.5 inches

Z_{cg} = 0.0 inches

I_{xx} = 0 slug-feet^2

I_{yy} = 0 slug-feet^2

I_{zz} = 0 slug-feet^2

I_{xy} = 0 slug-feet^2

I_{xz} = 0 slug-feet^2

I_{yz} = 0 slug-feet^2

LUNAR MODULE RCS PROPELLANT

MASS PROPERTIES

NOTE:

1. Mass Properties are given for liquid in individual tanks.
2. Moments of Inertia are about center of gravity of propellant in individual tanks, coordinates of which are given.
3. Centers of Gravity in Y and Z directions are given at top of each page.
4. The number of tanks of a particular kind is indicated by the last number on the first line of each page.

LM RCS FUEL MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = + OR - 14.5

RADIUS= 6.250 CYLINDRICAL SECITON= 18.650. WEIGHT= 103.7
DENSITY= 56.330 LBS/CU.FT.

(ULLAGE/(VOL.OF LIQUID))x100= 4.093

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
103.7	279.3	0.0	0.4
103.2	279.2	0.0	0.5
102.7	279.2	0.0	0.5
102.1	279.1	0.0	0.5
101.6	279.0	0.0	0.5
101.1	279.0	0.0	0.5
100.6	278.9	0.0	0.5
100.1	278.8	0.0	0.5
99.6	278.8	0.0	0.4
99.0	278.7	0.0	0.4
98.5	278.7	0.0	0.3
98.0	278.6	0.0	0.4
97.5	278.5	0.0	0.4
97.0	278.5	0.0	0.4
96.4	278.4	0.0	0.4
95.9	278.3	0.0	0.4
95.4	278.3	0.0	0.4
94.9	278.2	0.0	0.4
94.4	278.1	0.0	0.4
93.8	278.1	0.0	0.4
93.3	278.0	0.0	0.4
92.8	277.9	0.0	0.4
92.3	277.9	0.0	0.4
91.8	277.8	0.0	0.3
91.3	277.7	0.0	0.3
90.7	277.7	0.0	0.3
90.2	277.6	0.0	0.3
89.7	277.5	0.0	0.3
89.2	277.5	0.0	0.3
88.7	277.4	0.0	0.3
88.1	277.4	0.0	0.3
87.6	277.3	0.0	0.3
87.1	277.2	0.0	0.3
86.6	277.2	0.0	0.3
86.1	277.1	0.0	0.3
85.6	277.0	0.0	0.3
85.0	277.0	0.0	0.3
84.5	276.9	0.0	0.2
84.0	276.8	0.0	0.2
83.5	276.8	0.0	0.2
83.0	276.7	0.0	0.2
82.4	276.6	0.0	0.2
81.9	276.6	0.0	0.2

LM RCS FUEL MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = + OR - 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 18.650, WEIGHT= 103.7
DENSITY= 56.330 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
81.4	276.5	0.0	0.2
80.9	276.4	0.0	0.2
80.4	276.4	0.0	0.2
79.8	276.3	0.0	0.2
79.3	276.2	0.0	0.2
78.8	276.2	0.0	0.2
78.3	276.1	0.0	0.2
77.8	276.0	0.0	0.2
77.3	276.0	0.0	0.2
76.7	275.9	0.0	0.2
76.2	275.9	0.0	0.2
75.7	275.8	0.0	0.1
75.2	275.7	0.0	0.1
74.7	275.7	0.0	0.1
74.1	275.6	0.0	0.1
73.6	275.5	0.0	0.1
73.1	275.5	0.0	0.1
72.6	275.4	0.0	0.1
72.1	275.3	0.0	0.1
71.6	275.3	0.0	0.1
71.0	275.2	0.0	0.1
70.5	275.1	0.0	0.1
70.0	275.1	0.0	0.1
69.5	275.0	0.0	0.1
69.0	274.9	0.0	0.1
68.4	274.9	0.0	0.1
67.9	274.8	0.0	0.1
67.4	274.7	0.0	0.1
66.9	274.7	0.0	0.1
66.4	274.6	0.0	0.1
65.8	274.5	0.0	0.1
65.3	274.5	0.0	0.1
64.8	274.4	0.0	0.1
64.3	274.4	0.0	0.1
63.8	274.3	0.0	0.1
63.3	274.2	0.0	0.1
62.7	274.2	0.0	0.1
62.2	274.1	0.0	0.1
61.7	274.0	0.0	0.0
61.2	274.0	0.0	0.0
60.7	273.9	0.0	0.0
60.1	273.8	0.0	0.0
59.6	273.8	0.0	0.0

LM RCS FUEL MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = + OR - 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 18.650. WEIGHT = 103.7
DENSITY= 56.330 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
59.1	273.7	0.0	0.0
58.6	273.6	0.0	0.0
58.1	273.6	0.0	0.0
57.6	273.5	0.0	0.0
57.0	273.4	0.0	0.0
56.5	273.4	0.0	0.0
56.0	273.3	0.0	0.0
55.5	273.2	0.0	0.0
55.0	273.2	0.0	0.0
54.4	273.1	0.0	0.0
53.9	273.0	0.0	0.0
53.4	273.0	0.0	0.0
52.9	272.9	0.0	0.0
52.4	272.8	0.0	0.0
51.8	272.8	0.0	0.0
51.3	272.7	0.0	0.0
50.8	272.6	0.0	0.0
50.3	272.6	0.0	0.0
49.8	272.5	0.0	0.0
49.3	272.5	0.0	0.0
48.7	272.4	0.0	0.0
48.2	272.3	0.0	0.0
47.7	272.3	0.0	0.0
47.2	272.2	0.0	0.0
46.7	272.1	0.0	0.0
46.1	272.1	0.0	0.0
45.6	272.0	0.0	0.0
45.1	271.9	0.0	0.0
44.6	271.9	0.0	0.0
44.1	271.8	0.0	0.0
43.6	271.7	0.0	0.0
43.0	271.7	0.0	0.0
42.5	271.6	0.0	0.0
42.0	271.5	0.0	0.0
41.5	271.5	0.0	0.0
41.0	271.4	0.0	0.0
40.4	271.3	0.0	0.0
39.9	271.3	0.0	0.0
39.4	271.2	0.0	0.0
38.9	271.1	0.0	0.0
38.4	271.1	0.0	0.0
37.9	271.0	0.0	0.0
37.3	270.9	0.0	0.0

LM RCS FUEL MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = + OR - 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 18.560. WEIGHT= 103.7
DENSITY= 56.330 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
36.8	270.9	0.0	0.0
36.3	270.8	0.0	0.0
35.8	270.7	0.0	0.0
35.3	270.7	0.0	0.0
34.7	270.6	0.0	0.0
34.2	270.5	0.0	0.0
33.7	270.5	0.0	0.0
33.2	270.4	0.0	0.0
32.7	270.3	0.0	0.0
32.1	270.3	0.0	0.0
31.6	270.2	0.0	0.0
31.1	270.1	0.0	0.0
30.6	270.1	0.0	0.0
30.1	270.0	0.0	0.0
29.6	269.9	0.0	0.0
29.0	269.9	0.0	0.0
28.5	269.8	0.0	0.0
28.0	269.7	0.0	0.0
27.5	269.7	0.0	0.0
27.0	269.6	0.0	0.0
26.4	269.5	0.0	0.0
25.9	269.5	0.0	0.0
25.4	269.4	0.0	0.0
24.9	269.3	0.0	0.0
24.4	269.3	0.0	0.0
23.9	269.2	0.0	0.0
23.3	269.1	0.0	0.0
22.8	269.0	0.0	0.0
22.3	269.0	0.0	0.0
21.8	268.9	0.0	0.0
21.3	268.8	0.0	0.0
20.7	268.8	0.0	0.0
20.2	268.7	0.0	0.0
19.7	268.6	0.0	0.0
19.2	268.6	0.0	0.0
18.7	268.5	0.0	0.0
18.1	268.4	0.0	0.0
17.6	268.3	0.0	0.0
17.1	268.3	0.0	0.0
16.6	268.2	0.0	0.0
16.1	268.1	0.0	0.0
15.6	268.0	0.0	0.0
15.0	268.0	0.0	0.0

LM RCS FUEL MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = + OR - 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 18.650. WEIGHT= 103.7
DENSITY= 56.330 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
14.5	267.9	0.0	0.0
14.0	267.8	0.0	0.0
13.5	267.7	0.0	0.0
13.0	267.7	0.0	0.0
12.4	267.6	0.0	0.0
11.9	267.5	0.0	0.0
11.4	267.4	0.0	0.0
10.9	267.3	0.0	0.0
10.4	267.3	0.0	0.0
9.9	267.2	0.0	0.0
9.3	267.1	0.0	0.0
8.8	267.0	0.0	0.0
8.3	266.9	0.0	0.0
7.8	266.8	0.0	0.0
7.3	266.7	0.0	0.0
6.7	266.6	0.0	0.0
6.2	266.5	0.0	0.0
5.7	266.4	0.0	0.0
5.2	266.3	0.0	0.0
4.7	266.2	0.0	0.0
4.1	266.1	0.0	0.0
3.6	266.0	0.0	0.0
3.1	265.8	0.0	0.0
2.6	265.7	0.0	0.0
2.1	265.5	0.0	0.0
1.6	265.4	0.0	0.0
1.0	265.2	0.0	0.0
0.5	264.9	0.0	0.0

LM RCS OXIDIZER MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = - OR + 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 25.260. WEIGHT= 203.4
DENSITY= 90.050 LBS/CU.FT.

(ULLAGE/(VOL.OF LIQUID))x100= 5.621

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
203.4	275.7	0.0	1.4
202.4	275.6	0.0	1.4
201.4	275.5	0.0	1.4
200.3	275.4	0.0	1.4
199.3	275.3	0.0	1.4
198.3	275.3	0.0	1.3
197.3	275.2	0.0	1.3
196.3	275.1	0.0	1.3
195.3	275.0	0.0	1.3
194.2	274.9	0.0	1.3
193.2	274.9	0.0	1.2
192.2	274.8	0.0	1.2
191.2	274.7	0.0	1.2
190.2	274.6	0.0	1.2
189.2	274.5	0.0	1.2
188.1	274.5	0.0	1.2
187.1	274.4	0.0	1.1
186.1	274.3	0.0	1.1
185.1	274.2	0.0	1.1
184.1	274.1	0.0	1.1
183.1	274.1	0.0	1.0
182.0	274.0	0.0	1.0
181.0	273.9	0.0	1.0
180.0	273.8	0.0	1.0
179.0	273.7	0.0	1.0
178.0	273.7	0.0	0.9
177.0	273.6	0.0	0.9
175.9	273.5	0.0	0.9
174.9	273.4	0.0	0.9
173.9	273.3	0.0	0.8
172.9	273.3	0.0	0.8
171.9	273.2	0.0	0.8
170.9	273.1	0.0	0.8
169.8	273.0	0.0	0.8
168.8	272.9	0.0	0.8
167.8	272.9	0.0	0.7
166.8	272.8	0.0	0.7
165.8	272.7	0.0	0.7
164.8	272.6	0.0	0.7
163.7	272.5	0.0	0.7
162.7	272.5	0.0	0.7
161.7	272.4	0.0	0.6
160.7	272.3	0.0	0.6

LM RCS OXIDIZER MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = - OR + 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 25.260. WEIGHT= 203.4
DENSITY= 90.050 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
159.7	272.2	0.0	0.6
158.7	272.1	0.0	0.6
157.6	272.1	0.0	0.6
156.6	272.0	0.0	0.6
155.6	271.9	0.0	0.5
154.6	271.8	0.0	0.5
153.6	271.7	0.0	0.5
152.5	271.7	0.0	0.5
151.5	271.6	0.0	0.5
150.5	271.5	0.0	0.5
149.5	271.4	0.0	0.5
148.5	271.3	0.0	0.5
147.5	271.3	0.0	0.4
146.4	271.2	0.0	0.4
145.4	271.1	0.0	0.4
144.4	271.0	0.0	0.4
143.4	270.9	0.0	0.4
142.4	270.9	0.0	0.4
141.4	270.8	0.0	0.4
140.3	270.7	0.0	0.4
139.3	270.6	0.0	0.3
138.3	270.5	0.0	0.3
137.3	270.5	0.0	0.3
136.3	270.4	0.0	0.3
135.3	270.3	0.0	0.3
134.2	270.2	0.0	0.3
133.2	270.1	0.0	0.3
132.2	270.1	0.0	0.3
131.2	270.0	0.0	0.3
130.2	269.9	0.0	0.3
129.2	269.8	0.0	0.3
128.1	269.7	0.0	0.2
127.1	269.7	0.0	0.2
126.1	269.6	0.0	0.2
125.1	269.5	0.0	0.2
124.1	269.4	0.0	0.2
123.1	269.3	0.0	0.2
122.0	269.3	0.0	0.2
121.0	269.2	0.0	0.2
120.0	269.1	0.0	0.2
119.0	269.0	0.0	0.2
118.0	268.9	0.0	0.2
117.0	268.9	0.0	0.2

LM RCS OXIDIZER MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = - OR + 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 25.260. WEIGHT= 203.4
DENSITY= 90.050 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
115.9	268.8	0.0	0.2
114.9	268.7	0.0	0.2
113.9	268.6	0.0	0.1
112.9	268.5	0.0	0.1
111.9	268.5	0.0	0.1
110.9	268.4	0.0	0.1
109.8	268.3	0.0	0.1
108.8	268.2	0.0	0.1
107.8	268.1	0.0	0.1
106.8	268.1	0.0	0.1
105.8	268.0	0.0	0.1
104.8	267.9	0.0	0.1
103.7	267.8	0.0	0.1
102.7	267.7	0.0	0.1
101.7	267.7	0.0	0.1
100.7	267.6	0.0	0.1
99.7	267.5	0.0	0.1
98.6	267.4	0.0	0.1
97.6	267.3	0.0	0.1
96.6	267.3	0.0	0.1
95.6	267.2	0.0	0.1
94.6	267.1	0.0	0.1
93.6	267.0	0.0	0.1
92.5	266.9	0.0	0.0
91.5	266.9	0.0	0.0
90.5	266.8	0.0	0.0
89.5	266.7	0.0	0.0
88.5	266.6	0.0	0.0
87.5	266.5	0.0	0.0
86.4	266.5	0.0	0.0
85.4	266.4	0.0	0.0
84.4	266.3	0.0	0.0
83.4	266.2	0.0	0.0
82.4	266.1	0.0	0.0
81.4	266.1	0.0	0.0
80.3	266.0	0.0	0.0
79.3	265.9	0.0	0.0
78.3	265.8	0.0	0.0
77.3	265.7	0.0	0.0
76.3	265.7	0.0	0.0
75.3	265.6	0.0	0.0
74.2	265.5	0.0	0.0
73.2	265.4	0.0	0.0

LM RCS OXIDIZER MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = - OR + 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 25.260. WEIGHT= 203.4
DENSITY= 90.050 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
72.2	265.3	0.0	0.0
71.2	265.3	0.0	0.0
70.2	265.2	0.0	0.0
69.2	265.1	0.0	0.0
68.1	265.0	0.0	0.0
67.1	264.9	0.0	0.0
66.1	264.8	0.0	0.0
65.1	264.8	0.0	0.0
64.1	264.7	0.0	0.0
63.1	264.6	0.0	0.0
62.0	264.5	0.0	0.0
61.0	264.4	0.0	0.0
60.0	264.4	0.0	0.0
59.0	264.3	0.0	0.0
58.0	264.2	0.0	0.0
57.0	264.1	0.0	0.0
55.9	264.0	0.0	0.0
54.9	264.0	0.0	0.0
53.9	263.9	0.0	0.0
52.9	263.8	0.0	0.0
51.9	263.7	0.0	0.0
50.8	263.6	0.0	0.0
49.8	263.5	0.0	0.0
48.8	263.5	0.0	0.0
47.8	263.4	0.0	0.0
46.8	263.3	0.0	0.0
45.8	263.2	0.0	0.0
44.7	263.1	0.0	0.0
43.7	263.0	0.0	0.0
42.7	263.0	0.0	0.0
41.7	262.9	0.0	0.0
40.7	262.8	0.0	0.0
39.7	262.7	0.0	0.0
38.6	262.6	0.0	0.0
37.6	262.5	0.0	0.0
36.6	262.5	0.0	0.0
35.6	262.4	0.0	0.0
34.6	262.3	0.0	0.0
33.6	262.2	0.0	0.0
32.5	262.1	0.0	0.0
31.5	262.0	0.0	0.0
30.5	261.9	0.0	0.0
29.5	261.9	0.0	0.0

LM RCS OXIDIZER MASS PROPERTIES-70°F-2 TANKS
Y-CG = + OR - 44.6 (CONST) Z-CG = - OR + 14.5

RADIUS= 6.250 CYLINDRICAL SECTION= 25.260. WEIGHT= 203.4
DENSITY= 90.050 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ)	IYY or IZZ(S-FT.SQ)
28.5	261.8	0.0	0.0
27.5	261.7	0.0	0.0
26.4	261.6	0.0	0.0
25.4	261.5	0.0	0.0
24.4	261.4	0.0	0.0
23.4	261.3	0.0	0.0
22.4	261.2	0.0	0.0
21.4	261.1	0.0	0.0
20.3	261.0	0.0	0.0
19.3	260.9	0.0	0.0
18.3	260.8	0.0	0.0
17.3	260.7	0.0	0.0
16.3	260.6	0.0	0.0
15.3	260.5	0.0	0.0
14.2	260.4	0.0	0.0
13.2	260.3	0.0	0.0
12.2	260.2	0.0	0.0
11.2	260.1	0.0	0.0
10.2	260.0	0.0	0.0
9.2	259.8	0.0	0.0
8.1	259.7	0.0	0.0
7.1	259.6	0.0	0.0
6.1	259.4	0.0	0.0
5.1	259.3	0.0	0.0
4.1	259.1	0.0	0.0
3.1	258.9	0.0	0.0
2.0	258.7	0.0	0.0
1.0	258.4	0.0	0.0

LUNAR MODULE DESCENT WATER

MASS PROPERTIES

NOTE:

1. Mass Properties are given for liquid in individual tanks.
2. Moments of Inertia are about center of gravity of water in individual tanks, coordinates of which are given.
3. Centers of Gravity in Y and Z directions are given at top of each page.
4. The number of tanks of a particular kind is indicated by the last number on the first line of each page.

TABLE 5.4-1

LM 10 AND SUBSEQUENT DESCENT STAGE WATER MASS PROPERTIES

RADIUS = 14.2 INCHES DENSITY = 62.4 LBS/CU. FT. WEIGHT = 323.8 POUNDS

TANK NO. 1 Y-CG = -43.2 (CONSTANT) TANK NO. 2 Y-CG = 43.2 (CONSTANT)

Z-CG = -43.2 (CONSTANT) Z-CG = 43.2 (CONSTANT)

(ULLAGE/(VOLUME OF LIQUID)) X 100 = 37.757

Weight Pounds	Tank-1 X-CG	Tank-2 X-CG	Height Inches
333.0	166.0	142.9	19.542
323.8	165.8	142.7	19.080
322.2	165.8	142.7	19.000
320.6	165.8	142.7	18.921
318.9	165.7	142.6	18.841
317.3	165.7	142.6	18.762
315.7	165.6	142.5	18.683
314.1	165.6	142.5	18.605
312.5	165.6	142.5	18.527
310.8	165.5	142.4	18.449
309.2	165.5	142.4	18.371
307.6	165.4	142.3	18.294
806.0	165.4	142.3	18.217
304.4	165.4	142.3	18.140
302.8	165.3	142.2	18.064
301.1	165.3	142.2	17.987
299.5	165.3	142.2	17.911
297.9	165.2	142.1	17.835
296.3	165.2	142.1	17.760
294.7	165.1	142.0	17.684
293.0	165.1	142.0	17.609
291.4	165.1	142.0	17.534
289.8	165.0	141.9	17.459
288.2	165.0	141.9	17.385
286.6	165.0	141.9	17.310
284.9	164.9	141.8	17.236
283.3	164.9	141.8	17.162
281.7	164.8	141.7	17.088
280.1	164.8	141.7	17.014
278.5	164.8	141.7	16.941
276.8	164.7	141.6	16.867
275.2	164.7	141.6	16.794
273.6	164.6	141.5	16.721
272.0	164.6	141.5	16.648
270.4	164.6	141.5	16.575
268.8	164.5	141.4	16.502
267.1	164.5	141.4	16.430
265.5	164.5	141.4	16.357

TABLE 5.4-1 (CONTINUED)

LM 10 AND SUBSEQUENT DESCENT STAGE WATER MASS PROPERTIES

RADIUS = 14.2 INCHES
DENSITY = 62.4 LBS/CU. FT. WEIGHT = 323.8 POUNDS
TANK NO. 1 Y-CG = -43.2 (CONSTANT)
Z-CG = -43.2 (CONSTANT)
TANK NO. 2 Y-CG = 43.2 (CONSTANT)
Z-CG = 43.2 (CONSTANT)
(ULLAGE/(VOLUME OF LIQUID)) X 100 = 37.757

Weight Pounds	Tank-1 X-CG	Tank-2 X-CG	Height Inches
263.9	164.4	141.3	16.285
262.3	164.4	141.3	16.212
260.7	164.3	141.2	16.140
259.0	164.3	141.2	16.068
257.4	164.3	141.2	15.996
255.8	164.2	141.1	15.924
254.2	164.2	141.1	15.852
252.6	164.1	141.0	15.781
250.9	164.1	141.0	15.709
249.3	164.1	141.0	15.638
247.7	164.0	140.9	15.566
246.1	164.0	140.9	15.495
244.5	164.0	140.9	15.423
242.8	163.9	140.8	15.352
241.2	163.9	140.8	15.281
239.6	163.8	140.7	15.210
238.0	163.8	140.7	15.139
236.4	163.8	140.7	15.068
234.8	163.7	140.6	14.997
233.1	163.7	140.6	14.926
231.5	163.6	140.5	14.855
229.9	163.6	140.5	14.784
228.3	163.6	140.5	14.713
226.7	163.5	140.4	14.642
225.0	163.5	140.4	14.571
223.4	163.4	140.3	14.500
221.8	163.4	140.3	14.430
220.2	163.4	140.3	14.359
218.6	163.3	140.2	14.288
216.9	163.3	140.2	14.217
215.3	163.2	140.1	14.146
213.7	163.2	140.1	14.076
212.1	163.2	140.1	14.005
210.5	163.1	140.0	13.934
208.9	163.1	140.0	13.863
207.2	163.0	139.9	13.792
205.6	163.0	139.9	13.722
204.0	163.0	139.9	13.651

TABLE 5.4-1 (CONTINUED)

LM 10 AND SUBSEQUENT DESCENT STAGE WATER MASS PROPERTIES

RADIUS = 14.2 INCHES DENSITY = 62.4 LBS/CU. FT. WEIGHT = 323.8 POUNDS
TANK NO. 1 Y-CG = -43.2 (CONSTANT) TANK NO. 2 Y-CG = 43.2 (CONSTANT)
Z-CG = -43.2 (CONSTANT) Z-CG = 43.2 (CONSTANT)
(ULLAGE/(VOLUME OF LIQUID)) X 100 = 37.757

Weight Pounds	Tank-1 X-CG	Tank-2 X-CG	Height Inches
77.7	159.4	136.3	7.670
76.1	159.3	136.2	7.580
74.5	159.3	136.2	7.489
72.9	159.2	136.1	7.398
71.2	159.1	136.0	7.306
69.6	159.1	136.0	7.213
68.0	159.0	135.9	7.119
66.4	159.0	135.9	7.024
64.8	158.9	135.8	6.929
63.1	158.8	135.7	6.832
61.5	158.8	135.7	6.735
59.9	158.7	135.6	6.637
58.3	158.7	135.6	6.538
56.7	158.6	135.5	6.437
55.0	158.5	135.4	6.336
53.4	158.5	135.4	6.233
51.8	158.4	135.3	6.129
50.2	158.3	135.2	6.024
48.6	158.3	135.2	5.917
47.0	158.2	135.1	5.809
45.3	158.1	135.0	5.700
43.7	158.1	135.0	5.589
42.1	158.0	134.9	5.476
40.5	157.9	134.8	5.361
38.9	157.8	134.7	5.245
37.2	157.8	134.7	5.126
35.6	157.7	134.6	5.005
34.0	157.6	134.5	4.882
32.4	157.5	134.4	4.757
30.8	157.4	134.3	4.628
29.1	157.4	134.3	4.497
27.5	157.3	134.2	4.363
25.9	157.2	134.1	4.225
24.3	157.1	134.0	4.083
22.7	157.0	133.9	3.937
21.0	156.9	133.8	3.787
19.4	156.8	133.7	3.631
17.8	156.7	133.6	3.469
16.2	156.6	133.5	3.301
14.6	156.5	133.4	3.124

TABLE 5.4-1 (CONTINUED)

LM 10 AND SUBSEQUENT DESCENT STAGE WATER MASS PROPERTIES

RADIUS = 14.2 INCHES DENSITY = 62.4 LBS/CU. FT. WEIGHT = 323.8 POUNDS
TANK NO. 1 Y-CG = -43.2 (CONSTANT) TANK NO. 2 Y-CG = 43.2 (CONSTANT)
Z-CG = -43.2 (CONSTANT) Z-CG = 43.2 (CONSTANT)
(ULLAGE/(VOLUME OF LIQUID)) X 100 = 37.757

Weight Pounds	Tank-1 X-CG	Tank-2 X-CG	Height Inches
13.0	156.3	133.2	2.939
11.3	156.2	133.1	2.742
9.7	156.1	133.0	2.532
8.1	155.9	132.8	2.305
6.5	155.8	132.7	2.055
4.9	155.6	132.5	1.774
3.2	155.4	132.3	1.442
1.6	155.1	132.0	1.015

LUNAR MODULE ASCENT WATER

MASS PROPERTIES

NOTE:

1. Mass Properties are given for liquids in individual tanks.
2. Moments of Inertia are about center of gravity of water in individual tanks, coordinates of which are given.
3. Centers of Gravity in Y and Z directions are given at top of each page.
4. The number of tanks of a particular kind is indicated by the last number on the first line of each page.

LM ASCENT WATER MASS PROPERTIES-2 TANKS
Y-CG = + OR - 25.0 (CONST) Z-CG = + OR - 13.7 (CONST)

RADIUS=7.155 CYLINDRICAL SECTION= 0.0 WEIGHT= 41.2
DENSITY=62.400 LBS/CU.FT.

(ULLAGE/(VOL. OF LIQUID))x100= 34.481

WEIGHT	X-CG	IXX(S-FT.SQ.)	IYY or IZZ(S-FT.SQ.)
41.2	300.3	0.0	0.0
41.0	300.3	0.0	0.0
40.8	300.3	0.0	0.0
40.6	300.3	0.0	0.0
40.4	300.3	0.0	0.0
40.2	300.2	0.0	0.0
40.0	300.2	0.0	0.0
39.8	300.2	0.0	0.0
39.6	300.2	0.0	0.0
39.3	300.2	0.0	0.0
39.1	300.1	0.0	0.0
38.9	300.1	0.0	0.0
38.7	300.1	0.0	0.0
38.5	300.1	0.0	0.0
36.3	300.1	0.0	0.0
38.1	300.1	0.0	0.0
37.9	300.0	0.0	0.0
37.7	300.0	0.0	0.0
37.5	300.0	0.0	0.0
37.3	300.0	0.0	0.0
37.1	300.0	0.0	0.0
36.9	299.9	0.0	0.0
36.7	299.9	0.0	0.0
36.5	299.9	0.0	0.0
36.3	299.9	0.0	0.0
36.0	299.9	0.0	0.0
35.8	299.8	0.0	0.0
35.6	299.8	0.0	0.0
35.4	299.8	0.0	0.0
35.2	299.8	0.0	0.0
35.0	299.8	0.0	0.0
34.8	299.7	0.0	0.0
34.6	299.7	0.0	0.0
34.4	299.7	0.0	0.0
34.2	299.7	0.0	0.0
34.0	299.6	0.0	0.0
33.8	299.6	0.0	0.0
33.6	299.6	0.0	0.0
33.4	299.6	0.0	0.0
33.2	299.6	0.0	0.0
33.0	299.6	0.0	0.0
32.8	299.6	0.0	0.0
32.5	299.5	0.0	0.0

LM ASCENT WATER MASS PROPERTIES-2 TANKS
Y-CG = + OR - 25.0 (CONST) Z-CG = + OR - 13.7 (CONST)

RADIUS= 7.155 CYLINDRICAL SECTION= 0.0 WEIGHT= 41.2
DENSITY= 62.400 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ.)	IYY or IZZ(S-FT.SQ.)
32.3	299.5	0.0	0.0
32.1	299.5	0.0	0.0
31.9	299.5	0.0	0.0
31.7	299.5	0.0	0.0
31.5	299.4	0.0	0.0
31.3	299.4	0.0	0.0
31.1	299.4	0.0	0.0
30.9	299.4	0.0	0.0
30.7	299.4	0.0	0.0
30.5	299.3	0.0	0.0
30.3	299.3	0.0	0.0
30.1	299.3	0.0	0.0
29.9	299.3	0.0	0.0
29.7	299.3	0.0	0.0
29.5	299.2	0.0	0.0
29.3	299.2	0.0	0.0
29.0	299.2	0.0	0.0
28.8	299.2	0.0	0.0
28.6	299.2	0.0	0.0
28.4	299.1	0.0	0.0
28.2	299.1	0.0	0.0
28.0	299.1	0.0	0.0
27.8	299.1	0.0	0.0
27.6	299.1	0.0	0.0
27.4	299.0	0.0	0.0
27.2	299.0	0.0	0.0
27.0	299.0	0.0	0.0
26.8	299.0	0.0	0.0
26.6	299.0	0.0	0.0
26.4	298.9	0.0	0.0
26.2	298.9	0.0	0.0
26.0	298.9	0.0	0.0
25.7	298.9	0.0	0.0
25.5	298.9	0.0	0.0
25.3	298.8	0.0	0.0
25.1	298.8	0.0	0.0
24.9	298.8	0.0	0.0
24.7	298.8	0.0	0.0
24.5	298.8	0.0	0.0
24.3	298.7	0.0	0.0
24.1	298.7	0.0	0.0
23.9	298.7	0.0	0.0
23.7	298.7	0.0	0.0

LM ASCENT WATER MASS PROPERTIES-2 TANKS
Y-CG = + OR - 25.0 (CONST) Z-CG = + OR - 13.7 (CONST)

RADIUS= 7.155 CYLINDRICAL SECTION= 0.0 WEIGHT= 41.2
DENSITY= 62.400 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ.)	IYY or IZZ(S-FT.SQ.)
23.5	298.7	0.0	0.0
23.3	298.6	0.0	0.0
23.1	298.6	0.0	0.0
22.9	298.6	0.0	0.0
22.7	298.6	0.0	0.0
22.5	298.6	0.0	0.0
22.2	298.5	0.0	0.0
22.0	298.5	0.0	0.0
21.8	298.5	0.0	0.0
21.6	298.5	0.0	0.0
21.4	298.4	0.0	0.0
21.2	298.4	0.0	0.0
21.0	298.4	0.0	0.0
20.8	298.4	0.0	0.0
20.6	298.4	0.0	0.0
20.4	298.3	0.0	0.0
20.2	298.3	0.0	0.0
20.0	298.3	0.0	0.0
19.8	298.3	0.0	0.0
19.6	298.2	0.0	0.0
19.4	298.2	0.0	0.0
19.2	298.2	0.0	0.0
19.0	298.2	0.0	0.0
18.7	298.2	0.0	0.0
18.5	298.1	0.0	0.0
18.3	298.1	0.0	0.0
18.1	298.1	0.0	0.0
17.9	298.1	0.0	0.0
17.7	298.0	0.0	0.0
17.5	298.0	0.0	0.0
17.3	298.0	0.0	0.0
17.1	298.0	0.0	0.0
16.0	298.0	0.0	0.0
16.7	297.9	0.0	0.0
16.5	297.9	0.0	0.0
16.3	297.9	0.0	0.0
16.1	297.9	0.0	0.0
15.9	297.8	0.0	0.0
15.7	297.8	0.0	0.0
15.4	297.8	0.0	0.0
15.2	297.8	0.0	0.0
15.0	297.7	0.0	0.0
14.8	297.7	0.0	0.0

LM ASCENT WATER MASS PROPERTIES-2 TANKS
Y-CG = + OR - 25.0 (CONST) Z-CG = + OR - 13.7 (CONST)

RADIUS= 7.155 CYLINDRICAL SECTION= 0.0 WEIGHT= 41.2
DENSITY= 62.400 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ.)	IYY or IZZ(S-FT.SQ.)
14.6	297.7	0.0	0.0
14.4	297.7	0.0	0.0
14.2	297.6	0.0	0.0
14.0	297.6	0.0	0.0
13.8	297.6	0.0	0.0
13.6	297.6	0.0	0.0
13.4	297.5	0.0	0.0
13.2	297.5	0.0	0.0
13.0	297.5	0.0	0.0
12.8	297.5	0.0	0.0
12.6	297.4	0.0	0.0
12.4	297.4	0.0	0.0
12.2	297.4	0.0	0.0
11.9	297.4	0.0	0.0
11.7	297.3	0.0	0.0
11.5	297.3	0.0	0.0
11.3	297.3	0.0	0.0
11.1	297.3	0.0	0.0
10.9	297.2	0.0	0.0
10.7	297.2	0.0	0.0
10.5	297.2	0.0	0.0
10.3	297.2	0.0	0.0
10.1	297.1	0.0	0.0
9.9	297.1	0.0	0.0
9.7	297.1	0.0	0.0
9.5	297.0	0.0	0.0
9.3	297.0	0.0	0.0
9.1	297.0	0.0	0.0
8.9	297.0	0.0	0.0
8.7	296.9	0.0	0.0
8.4	296.9	0.0	0.0
8.2	296.9	0.0	0.0
8.0	296.8	0.0	0.0
7.8	296.8	0.0	0.0
7.6	296.8	0.0	0.0
7.4	296.7	0.0	0.0
7.2	296.7	0.0	0.0
7.0	296.7	0.0	0.0
6.8	296.6	0.0	0.0
6.6	296.6	0.0	0.0
6.4	296.6	0.0	0.0
6.2	296.5	0.0	0.0
6.0	296.5	0.0	0.0

LM ASCENT WATER MASS PROPERTIES-2 TANKS
Y-CG = + OR - 25.0 (CONST) Z-CG = + OR - 13.7 (CONST)

RADIUS= 7.155 CYLINDRICAL SECTION= 0.0 WEIGHT= 41.2
DENSITY= 62.400 LBS/CU.FT.

WEIGHT	X-CG	IXX(S-FT.SQ.)	IYY or IZZ (S-FT.SQ.)
5.8	296.5	0.0	0.0
5.6	296.4	0.0	0.0
5.4	296.4	0.0	0.0
5.1	296.4	0.0	0.0
4.9	296.3	0.0	0.0
4.7	296.3	0.0	0.0
4.5	296.2	0.0	0.0
4.3	296.2	0.0	0.0
4.1	296.2	0.0	0.0
3.9	296.1	0.0	0.0
3.7	296.1	0.0	0.0
3.5	296.0	0.0	0.0
3.3	296.0	0.0	0.0
3.1	295.9	0.0	0.0
2.9	295.9	0.0	0.0
2.7	295.9	0.0	0.0
2.5	295.8	0.0	0.0
2.3	295.7	0.0	0.0
2.1	295.7	0.0	0.0
1.9	295.6	0.0	0.0
1.6	295.6	0.0	0.0
1.4	295.5	0.0	0.0
1.2	295.4	0.0	0.0
1.0	295.4	0.0	0.0
0.8	295.3	0.0	0.0
0.6	295.2	0.0	0.0
0.4	295.1	0.0	0.0
0.2	294.9	0.0	0.0

LUNAR MODULE TRAPPED AND RESIDUAL PROPELLANTS AND MISCELLANEOUS CONSUMABLES

TABLE 5.6-1

LUNAR MODULE TRAPPED AND RESIDUAL PROPELLANTS

	WEIGHT (Pounds)	CENTER OF GRAVITY (Inches)		
APS - Trapped Outside Tanks	LM-10 and Subs.	X_E	Y_E	Z_E
Fill and Drain Lines - Fuel	0.2	218.5	-36.3	16.7
- Oxidizer	0.8	216.0	23.2	14.0
Engine (to SOV) - Fuel	0.2	235.8	0.0	10.5
- Oxidizer	0.3	235.8	0.0	10.5
Isolation Squib - Fuel	0.2	218.5	-36.3	16.7
- Oxidizer	0.1	216.0	23.2	14.0
APS/RCS Interconnect - Fuel	1.6	218.5	-36.3	16.7
- Oxidizer	2.3	216.0	23.2	14.0
[1] Feed Lines - Fuel	3.7	218.5	-36.3	16.7
- Oxidizer	4.8	216.0	23.2	14.0
Total Outside Tanks - Fuel	5.9	219.1	-35.0	16.5
- Oxidizer	8.3	216.7	22.4	13.9

---

[1] APS and DPS propellant trapped in feed lines is considered usable for depletion burns.

TABLE 5.6-1 (CONTINUED)

LUNAR MODULE TRAPPED AND RESIDUAL PROPELLANTS

	WEIGHT (Pounds)
	LM-10 and Subs.
APS - Trapped Inside Tanks	
Tank Wetting - Fuel	1.0
- Oxidizer	1.0
Propellant Vapor - Fuel	1.0
- Oxidizer	13.8
Unporting Prevention - Fuel	7.1
- Oxidizer	11.3
"Zero-G" Cans - Fuel	1.2
- Oxidizer	2.0
Thrust Vector Deviation from Vehicle Center Line - Fuel	0.4
- Oxidizer	0.6
Engine and Valve Operation - Fuel	3.1
- Oxidizer	3.7
[1]Feed Lines - Fuel	-3.7
- Oxidizer	-4.8
Total Trapped in Tanks - Fuel	10.1
- Oxidizer	27.6

---

[1] APS and DPS propellant trapped in feed lines is considered usable for depletion burns.

TABLE 5.6-1 (CONTINUED)

LUNAR MODULE TRAPPED AND RESIDUAL PROPELLANTS

	WEIGHT (Pounds)	CENTER OF GRAVITY (Inches)		
DPS - Trapped Outside Tanks	LM-10	X_E	Y_E	Z_E
Fill and Drain Lines - Fuel	0.1	133.5	-5.3	-24.8
- Oxidizer	0.2	133.3	25.0	-1.9
Balance Lines - Fuel	0.0			
- Oxidizer	0.0			
Branch Lines - Fuel	4.0	133.5	-5.3	-24.8
- Oxidizer	8.5	133.3	25.0	-1.9
Engine (to SOV) - Fuel	6.4	154.0	0.0	0.0
- Oxidizer	12.2	154.0	0.0	0.0
Isolation Squib - Fuel	0.7	133.5	-5.3	-24.8
- Oxidizer	0.8	133.3	25.0	-1.9
[1]Feed Lines - Fuel	12.1	133.5	-5.3	-24.8
- Oxidizer	27.5	133.3	25.0	-1.9
[1]Heat Exchanger - Fuel	4.4	155.2	-15.0	-21.3
- Oxidizer	0.0			
Total Trapped Outside Tanks - Fuel	27.7	140.0	-5.6	-19.8
- Oxidizer	49.2	137.5	19.9	-1.5

---

[1] APS and DPS propellant trapped in feed lines is considered usable for depletion burns.

TABLE 5.6-1 (CONTINUED)

LUNAR MODULE TRAPPED AND RESIDUAL PROPELLANTS

	WEIGHT (Pounds)		
DPS - Trapped Inside Tanks	LM-10	LM-11	LM-12
Tank Wetting - Fuel	2.0	2.0	2.0
- Oxidizer	2.0	2.0	2.0
Propellant Vapor - Fuel	2.5	2.5	2.5
- Ozidizer	19.0	19.0	19.0
"Zero-G" Cans - Fuel	4.5	4.5	4.5
- Oxidizer	7.2	7.2	7.2
[2]Thurst Vector Deviation from Vehicle Center Line - Fuel (+Y Tank)	19.8±4.2	23.0±11.5	23.0±11.5
- Oxidizer (-Z Tank)	31.2±13.2	48.0±24.0	48.0±24.0
Engine and Valve Operation - Fuel	2.9	2.9	2.9
- Oxidizer	2.6	2.6	2.6
Branch Line Orificing - Fuel	6.7±17.3	2.4±12.0	7.3±8.3
- Oxidizer	5.1±16.6	2.2±18.0	9.8±19.9
[1]Feed Lines and Heat Exchanger - Fuel	-16.5	-16.5	-16.5
- Oxidizer	-27.5	-27.5	-27.5
Total Trapped Inside Tanks - Fuel	21.9±18.0	20.8±16.6	25.7±14.2
- Oxidizer	39.6±21.2	53.5±30.0	61.1±31.2

---

[1] APS and DPS propellant trapped in feed lines is considered usable for depletion burns.

[2] LM-11 and 12 reflect c.g. limit of ±1" in Y and/or Z. Location is in fuel and oxidizer tanks which are furthest from c.g.

TABLE 5.6-1 (CONCLUDED)

LUNAR MODULE TRAPPED AND RESIDUAL PROPELLANTS

	WEIGHT (Pounds)		CENTER OF GRAVITY (Inches)		
RCS - Trapped Outside Tanks	LM-8	LM-10	X_E	Y_E	Z_E
System Residuals - Fuel	10.8	10.5	268.0	0.0	-5.0
- Oxidizer	17.6	15.8	268.0	0.0	-5.0
RCS - Trapped Inside Tanks					
Expulsion Efficiency - Fuel	4.2	4.2			
- Oxidizer	8.0	8.0			

TABLE 5.6-2

LM-10 AND SUBSEQUENT MISCELLANEOUS CONSUMABLES

	WEIGHT (Pounds)	CENTER OF GRAVITY (Inches)		
		X_E	Y_E	Z_E
ECS COOLANT:				
Ascent - Primary	32.1	251.9	9.9	-2.4
- Redundant	3.3	251.0	9.9	-2.4
Descent - Primary	1.7	163.5	25.0	38.0
- Redundant	0.0			
GOX:				
Ascent - Tank #1	2.4	266.1	15.1	-53.5
- Tank #2	2.4	266.1	-15.1	-53.5
Descent - Tank #1	48.0	185.6	38.9	-53.5
- Tank #2	48.0	185.2	41.5	48.2
WATER:				
Ascent - Tank #1	42.5	300.4	25.0	13.7
- Tank #2	42.5	300.4	-25.0	-13.7
*Descent - Tank #1		166.0	-43.2	-43.2
- Tank #2		141.9	43.2	43.2
NITROGEN:				
Ascent	0.1	301.5	+25.0	13.7
	0.1	301.5	-25.0	-13.7
Descent	0.6	169.4	-43.2	-43.2
HELIUM:				
APS - Tank #1	6.6	246.2	12.2	-48.6
- Tank #2	6.6	246.2	-12.2	-48.6
RCS - Tank #1	1.05	263.0	46.1	0.6
- Tank #2	1.05	263.0	-46.1	-0.6
DPS - (SHe)	48.5	148.3	47.2	-47.8
- (Ambient)	1.1	175.8	59.2	-37.0

*See Mission Loading information in Section 3.0 for the required Descent Water load for each mission.